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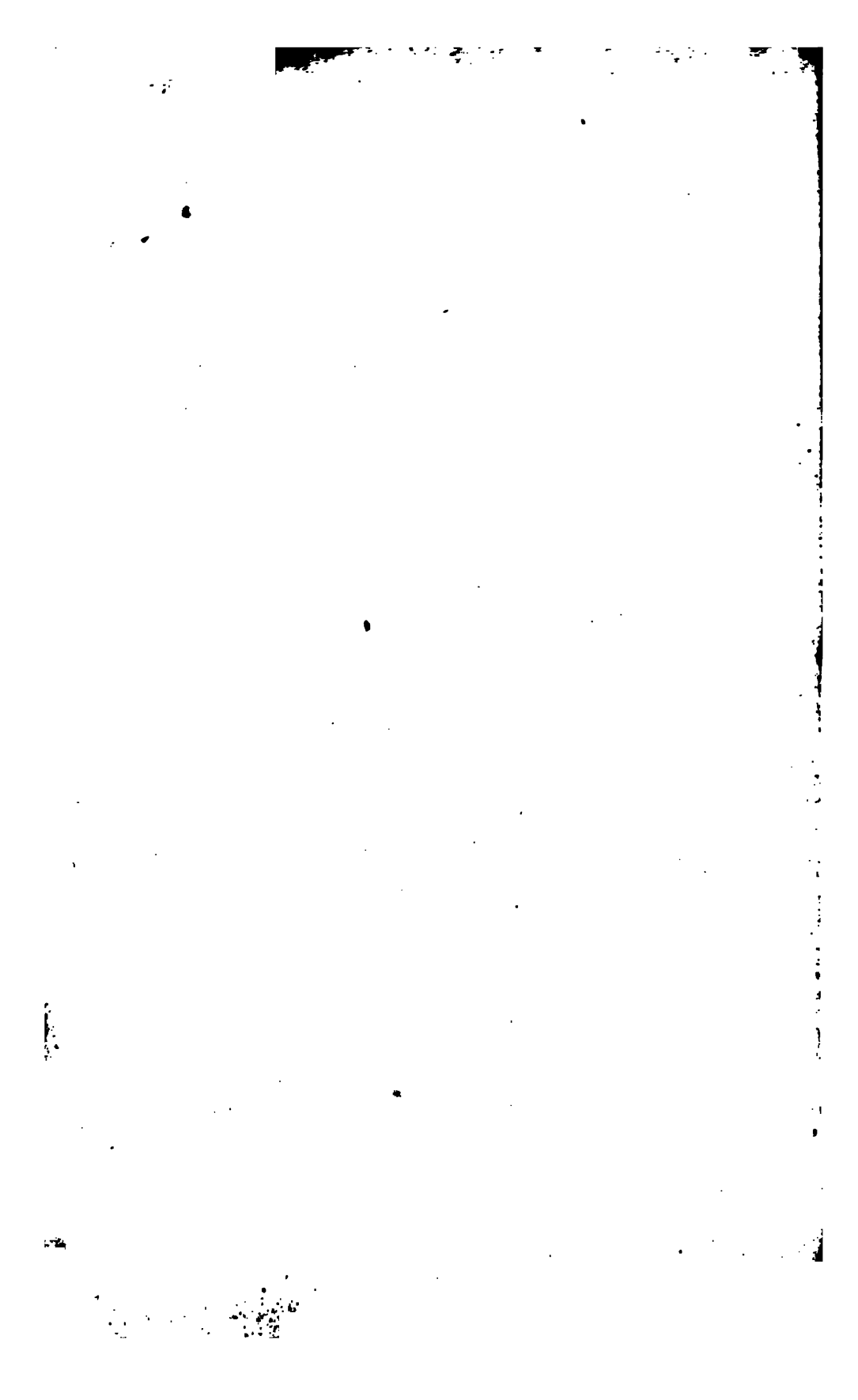
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EXTENDED AND REVISED AT REQUEST OF THE AUTHOR

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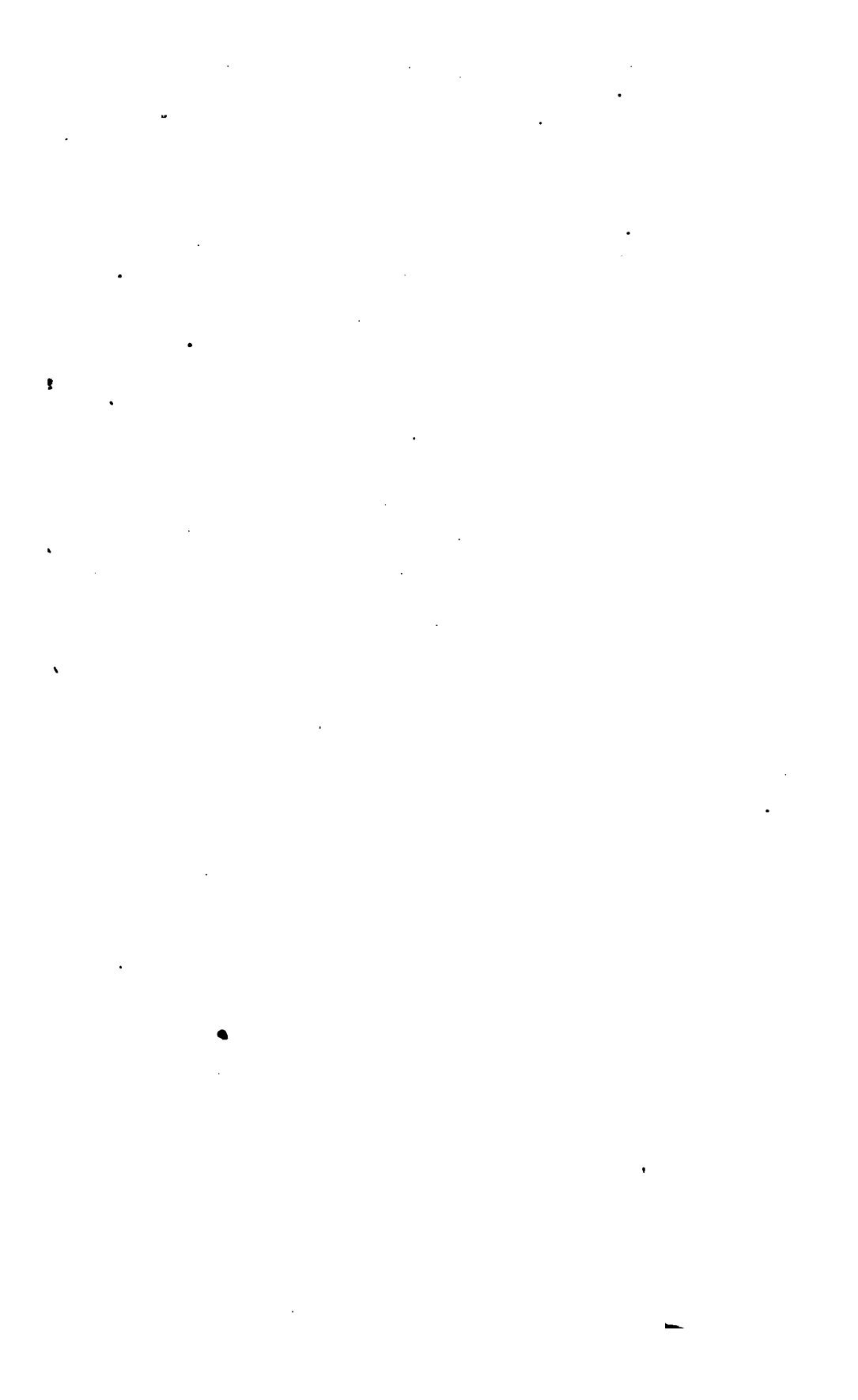
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TO
ALL MEMBERS
OF THE
MEDICAL PROFESSION,
WHO
CHASTENED BY EXPERIENCE AND OBSERVATION, AND RISING ABOVE
THE TRAMMELS OF PARTY FEELING,
ARE READY TO RECOGNIZE VALUABLE CONTRIBUTIONS TO MEDICAL SCIENCE,
AND TO ADOPT MEASURES
PROVED SUCCESSFUL IN RELIEVING HUMAN SUFFERING:
TO ALL
WITH WHOM THE LOVE OF TRUTH AND ITS DISSEMINATION ARE
PARAMOUNT TO PROFESSIONAL PRIDE OR
INDIVIDUAL OPINION:
TO ALL
WHO ARE FREE TO CHOOSE AND FREE TO ACT:
IN FINE,
TO ALL GENUINE ECLECTICS,
WHO HAVE CHOSEN MEDICINE FOR THEIR FIELD OF LABOR,
THESE LECTURES,
ARE MOST RESPECTFULLY INSCRIBED, BY
THEIR FRIEND AND CO-LABORER,
THE AUTHOR.



EDITOR'S PREFACE TO THE SECOND EDITION.

THE rapid sale of the first edition of *THE AMERICAN ECLECTIC PRACTICE OF MEDICINE*, and the urgent and continued demand for the work since that edition was exhausted, afford incontestable evidence of the high estimate placed upon its merits by the liberal portion of the medical profession. Any attempt therefore on the part of the Editor, to eulogize the work or commend it to public favor, would be very much like an advocate's persisting in arguing a case before a jury that had already rendered their verdict in favor of his client. A brief explanation of the circumstances under which the work has been again prepared for the press, and a reference to the new features it has received in the hands of the Editor, may not however be deemed improper.

In the autumn of 1856, Prof. I. G. Jones, who was then, and had been for some time in a very low state of health, requested the writer to undertake the revisal of his work and its superintendence through the press; and arrangements were at once commenced for carrying out the object of that request.

The plan of the new edition, according to the desire of Prof. Jones, was to be about as follows:

1. The "posthumous writings of Prof. T. V. Morrow" were to be omitted, as being for the most part a reiteration of what was taught elsewhere in the work, and an equal amount of new matter introduced.

2. A series of lectures or essays on the general principles of medicine was to be prepared by the Editor, as introductory to the description and treatment of special diseases.

3. The general arrangement of Prof. Jones' lectures, as they appeared in the first edition, was to be retained.

4. Such modifications of, and additions to the original text were to be made, as upon consultation between the author and the editor should be deemed advisable.

EDITOR'S PREFACE TO THE SECOND EDITION.

a basis for that part of the work that was to consist of new matter, the Editor prepared and preserved the notes of a part of his course of lectures in "The Eclectic College of Medicine;" and from those notes the lectures on the Principles of Medicine, as now published in this work, have since been written out. Some consultation also, was had with Prof. Jones during the last winter, in regard to modifications of his lectures, and his wishes in part ascertained. Those wishes the Editor has endeavored faithfully to carry into effect. But the rapidly failing health of Prof. Jones rendered further consultation impracticable, and his decease in March caused the enterprise to be suspended. In May however, the Editor purchased the copy-right of the work from the Executors, and at once entered upon the labor of preparing it for publication.

It is therefore within the short space of five months, that most of the labor of writing out the lectures on the Principles of Medicine and editing the new edition has been performed, and that too, in addition to the daily duties of active medical practice, and during part of the time, those of a professor in a medical college. These statements it is hoped will be regarded as a sufficient apology for any imperfections and want of finish that may be detected in the original matter. More time would have been taken for the performance of the task, had not the anxiety of the publishers to meet demands for the work, and the importance of furnishing it as a text-book to students in the medical colleges during the coming winter, made its publication at an early day extremely desirable.

With much diffidence the editor now submits his first effort at authorship to the scrutinizing eye of the medical profession. He entered upon the task with great misgiving, at the earnest request of many friends and especially of his much beloved and now lamented preceptor, Prof. I. G. Jones. His leading objects in so doing were, to keep within reach of the profession one of the plainest and most reliable guides in medical practice that has ever been prepared, and to give it that shape which would make it conform to the wishes of the author and the wants of the medical student and practitioner. He regrets that he could not have enjoyed the coöperation of Prof. Jones until the work was revised, as it is probable that many improvements would then have been made, that have not occurred to the Editor, and that some modifications would have been effected, which he could not make without taking liberties with the original, that he did not feel at liberty to assume. Respect for the deceased has restrained him from making any alterations which he was not sure would have been approved by Prof. Jones. He was,

EDITOR'S PREFACE TO THE SECOND EDITION.

furthermore, resolved that where he could not mend with certainty, he would not mar the original.

In preparing his own lectures and the notes that have been interspersed through the work, the Editor was compelled to study brevity. The space allotted to new matter could not be greater than that now occupied, without swelling the work to a size beyond the views of the publishers. It was therefore necessary to condense each subject within the smallest practicable compass, and after all many topics have been unavoidably omitted that it was desirable to have introduced.

It is believed however, that all the most important information in regard to the subjects treated of, is presented in an intelligible manner, that will be none the less acceptable because of the absence of tedious and uninteresting details. Those who are not satisfied with a style so comprehensive and categorical are referred to more diffuse and voluminous treatises. The special object of the Editor in preparing his lectures for publication in connection with those of Prof. Jones, was simply to announce such well-settled principles as are generally recognized by scientific medical writers, without entering into the arguments by which they are sustained. Where his views differ from others he has let the fact be known, and stated the grounds of his opinions. He lays little claim to originality however, except in the manner of presentation, and even in this he has not deemed it necessary to depart so far from the course pursued by others as to assume an air of eccentricity. For the general arrangement of the subjects he is more indebted to Dr. Williams' work on the Principles of Medicine than to any other; but he has freely consulted the other standard authors, and kept a constant view to such new scientific developments as were presented in the medical journals and reviews.

If the perusal of the Editor's lectures shall convince the student that medical practice may be based upon a system of well ascertained scientific principles, give him some insight of the philosophy that should guide the practitioner in the management of disease, and awaken a desire to pursue the subject further by consulting abler and more learned authors, the object of their publication will be attained, and the utmost ambition of their author in this behalf fully gratified.

W. S.

CINCINNATI, November, 1857.



CONTENTS.

	PAGE.
Preface to the Second Edition, - - - - -	5
Preface to the First Edition, - - - - -	17
Introductory Lecture, - - - - -	21

GENERAL PATHOLOGY.

LECTURE I.

Preliminary Observations: Medicine as a Science—as an Art; Relation of Practical Medicine and Pathology to each other—to other Departments. Disease Defined. Methods of Pathological Investigation: Synthetical Method; Analytical Method; Autopsy, - - - - -	89
---	----

LECTURE II.

On Disease of the Fluids: Causes and consequences of morbid states of the Blood; 1, Presence of deleterious foreign substances, 2, Want of due proportion as to quantity among the normal elements, 3, Abnormal character of the constituents of the Blood, - - - - -	51.
---	-----

LECTURE III.

On disease of the Solids: Preliminary Remarks; Disease from Mechanical and Chemical Causes; Disease resulting from modifications of vital properties; Functional disease; Elementary Morbid changes. I. Diseased Irritability, - - - - -	63.
--	-----

LECTURE IV.

Functional Disease, continued: II. Disease of Tonicity; Disease of Nervous Functions; General Observations; III. Diseased Sensibility; 1, Diseased General Sensibility; 2, Diseased Local Sensibility; IV. Diseased Voluntary Motion; Diseased General Voluntary Power, - - - - -	74.
---	-----

LECTURE V.

Functional Disease, continued: V. Disease of Reflex Nervous Influence; Excito-Motory and Excito-Secretory Sub-Systems of Nerves; Increase of Involuntary Excito-Motor Power; Deficiency of Involuntary Excito-Motor Functions; Reflected Sensibility, - - - - -	87
---	----

LECTURE VI.

Functional Disease, continued: VI. Disease of Secretion; General Observations on the Function of Secretion; Nutrition; Assimilation; Secretion Proper,—Recrementitious, Excrementitious; Excessive Secretion; Deficient Secretion; Perverted Secretion; Recapitulation, - - - - -	97.
---	-----

LECTURE VII.

Functional Disease, continued: Proximate Elements of Disease, Explanatory Remarks; Anæmia, Definition and Synonyms; General Anæmia, Condition of the Blood,	
---	--

CONTENTS.

Autopsy, Causes, Consequences; Local Anæmia; Hyperæmia, Definition; General Hyperæmia, or Plethora; Sthenic Plethora; Asthenic Plethora, - - - 107

LECTURE VIII.

Local Hyperæmia; Definition, Division of Subject; Determination of Blood or active Congestion; Physiological Determination; Morbid Determination; Caused by Stimuli,—Microscopic Appearances; Suggested distinction between Determination and Active Congestion; Determination from Intropulsion; Nature of Active Congestion; Its symptoms in the part affected, In other parts; Duration and Results; Determination to the Brain—Lungs—Liver; Therapeutic Suggestions, - - - 118

LECTURE IX.

Passive Congestion: General Remarks; Causes—1, Atony of Blood-Vessels, General, Local; 2, Venous Obstructions; Symptoms and Effects; Passive Congestion of the Brain, Stomach, Liver; Therapeutic Indications.—Inflammation—Note. Structural Diseases, or Diseases of Nutrition: General Observations; Increased Nutrition—Hypertrophy; Simple Hypertrophy; Complex Hypertrophy; Therapeutic Measures, - - - - - 129

LECTURE X.

Structural Diseases continued: Perverted Nutrition; General Remarks; Induration—Nature, Causes, Therapeutic Indications; Softening of Tissues—Nature, Causes, Therapeutic Indications; Degeneration of Tissue, Preliminary Observations; Fibrous Degeneration, Granular Degeneration, Fatty Degeneration, Calcareous or Bony Degeneration; Therapeutic Measures for Degeneration of Tissues, - - - 146

LECTURE XI.

Structural Diseases continued: Deposits in or upon Tissues; Preliminary Observations; Euplastic Deposits or Cicatrices, Repair of Injured Structures, Management of Injuries; Cacoplastic Deposits, Definition and Description, Their Tendency to Degenerate, Causes; Aplastic Deposits—Yellow Tubercle, Description, Softening, Absorption, Effects on Structures, Liability of Different Structures, Liability of Different Ages, Nature, Cause, Microscopic Characters, Chemical Analysis; The subject of Morbid Deposits Reviewed; Therapeutic Indications, - - - 158

LECTURE XII.

Structural Diseases continued: Morbid Growths; Definition and Classification. I. Non-Malignant Growths,—Cysts,—Non-Malignant Organized Tumors. II. Malignant Growths,—Species: 1, Scirrhus—Carcinomatous Carcinoma, or Stone Cancer. 2, Medullary Carcinoma—Fungus Hæmatodes, or Soft Cancer. 3, Gelatinous Carcinoma—Colloid Cancer, or Soft Cancer; Peculiar Constituents of Cancerous Substance; Nature and Development of Cancer; Is Cancer Contagious? Exciting Causes; Liability of Different Structures, Sexes and Ages; Symptoms, Local and Constitutional; Therapeutic Measures. III. Parasitic Animals—Entozoa, - 174

ETIOLOGY, OR THE CAUSES OF DISEASE.

LECTURE XIII.

On Morbific Causes generally: Definition and General Remarks; Classification. Pre-dispositions: I. Peculiarities of Constitution; 1, Hereditary Tendencies, 2, Temperaments, 3, Idiosyncrasies, 4, Sex, 5, Age—Infancy—Childhood—Puberty—Termination of Growth—Adult Life—Old Age, 6, Effects of Previous Diseases; II. Debility; Causes,—1, Imperfect Nourishment, 2, Impure Air, 3, Excessive

CONTENTS.

Exercise, 4, Want of Exercise, 5, Long-continued Exposure to Heat, 6, Long-continued Exposure to Cold, 7, Habitual Use of Intoxicating Drinks, 8, Depressing States of the Mind, 9, Waste of the Blood; III. Functional Excitement; IV. Existing Disease; V. Occupation and Modes of Life, - - - 196

LECTURE XIV.

Exciting Causes of Disease: I. Cognizable Causes,—1, Mechanical; 2, Chemical—Irritants—Corrosives—Septics—Alteratives; 3, Ingesta—Non-alimentary—Improper Quality of Aliment—Excess and Deficiency of Aliment in Quantity; 4, Excess and want of Exercise; 5, Excessive Nervous Action; 6, Excessive Evacuation; 7, Suppressed or Defective Evacuation; 8, Filth, Bad Air, and Poisonous Vapors; 9, Atmospheric Vicissitudes, - - - - 212

LECTURE XV.

Exciting Causes continued: II. Non-Cognizable Agents; 1, Endemic Poisons. 2, Epidemic Poisons, Different Theories, Ozone, Schönbein's Researches; 3, Infectious Poisons, Difference between Infection and Contagion, Modes of Access to the System, Mode of Operation within the System, Protection from Subsequent Attacks, - - - - - 232

SYMPTOMATOLOGY, OR SEMEIOLOGY.

LECTURE XVI.

Symptoms and Signs of Disease: Definition and Explanation of Terms; Physical Signs; Methods of Discovering,—1, Inspection—2, Touch or Palpation—3, Pressure—4, Succession—5, Percussion—6, Auscultation; Vital Symptoms; Sources and Interpretation—The Pulse, Skin, Tongue, Alvine Evacuations, Urine,—Interrogating Patient and Others—Liability to be Misled; Diagnosis: General and Special, Methods of Conducting Examinations; Prognosis; Empirical, Rational, Circumstances to be Considered, - - - - 239

SPECIAL PATHOLOGY AND THERAPEUTICS.

MALARIAL FEVERS.

LECTURE I.

General Description of Fever, Importance,—Definition;—Symptoms in Different Stages; 1st, Forming; 2d, Cold; 3d, Hot; 4th, Sweating Stage, - - - 257

LECTURE II.

Crisis in Fever. Two General Classes of Fever, Symptomatic and Idiopathic. Causes of Fever; Broussais' Doctrine, Local Diseases only Secondary; Nervous System primarily affected; Secretions and Circulation affected Secondarily; Typhoid differs; Secondary Disease may become paramount; Violence of Fever depends in part on Cause; Miasmata—What are they? How produced, Where they prevail, In what Seasons, - - - - 266

LECTURE III.

Classification of Fevers: True Classification suggested, Old Names Retained; Inter-mittent Fever, Types, Varieties, Stages: 1st, Forming; 2d, Cold; 3d, Hot; 4th,

CONTENTS.

Sweating; Modifications—Neuralgic Affections, Sun Pain, etc.—General Remarks, Paroxysms may occur Day or Night, Wearing out Ague, "Ague Cake," Tendency to Relapse.	- 274
---	-------

LECTURE IV.

Intermittent Fever continued: Periodicity; Diversity of Opinion; Explanation Suggested;—Complications; Gastro-Intestinal Inflammation; Congestion of Liver, Spleen and Brain;—General Remarks; Differences of Susceptibility; Post-Mortem; Causes, Predisposing and Exciting; Prognosis; Diagnosis; Treatment, Palliative and Radical,	- 284
--	-------

LECTURE V.

Treatment continued: Palliatives—How Varied; Restlessness—Case Cited; Determination to Head; Doubtful Cases—Case Cited; Radical Treatment—General Directions—Remedies; Former Practice—Evacuants; Dr. Morrow's Practice, Reasons for Differing; Popular Remedies—Case Cited; Treatment for Vomiting and Purging, For Nervous Irritation; Protracted Cases; Additional Means—Tonics—Cinchona—Iron; Remarks on Various Remedies; Dr. Bell opposed to Fowler's Solution of Arsenic; Old School Doctrines; Differences between Authors; Opinions of Dr. Bell and Dr. Wood Compared and Criticized,	- 294
--	-------

LECTURE VI.

Treatment of Intermittent Fever continued: Neuralgic cases; Sun-Pain; Local Inflammations; Remarks on Treatment, Doctrine of Books set aside; Periodic Symptoms in other Diseases; Scarletina, Croup, etc. Prophylactic Treatment—Recipes; Cholagogue Pill—Recipe; General Directions; Concluding Remarks. Remittent Fever: Synonyms, Locality, Seasons, Periodicity; Differs from Intermittent; Differences of Susceptibility; Forming Stage, Chill, Fever, Remission. Modifications; Complications; Congestion of Liver; Biliary Derangement; Gastric Disorders; Variations of Pulse,	- 311
---	-------

LECTURE VII.

Complications of Remittent Fever continued: Inflammation of the Lungs; Disease of the Spleen, Liver, Stomach; Local Disease Secondary; Cause of Bilious Fever; Endemic Character explained; Influence of age, sex, habit, etc.; Latent Period; Diagnosis; Prognosis; Duration; Post-mortem; Treatment; Old School Doctrines, Quotations, Remarks on Calomel, Bleeding; Dr. Wood on Mercury and Quinia; Reply,	- 325
---	-------

LECTURE VIII.

Remittent Fever continued: Treatment; Palliate till Fever begins to Decline; Anti-periodics—Recipe; If not arrested the first day, repeat; Emetics considered; Cathartics considered; Treatment has reference to Paroxysm; Tonics, when necessary; Different Complications; Gastro-intestinal Symptoms, Treatment; Congestive Variety—Symptoms—Treatment; Overaction of Liver—Remedy for; Determination to Brain—Symptoms—Treatment; General Remarks; Typhoid Symptoms;—Management of such cases; Diet and Exercise,	- 342
--	-------

LECTURE IX.

Congestive Fever: Preliminary Remarks; Dr. Armstrong's Views; Synonymous with Typhus; Malarial Origin; Not Contagious, Mere Modification of Bilious Fever; Symptoms; Treatment, Palliative and Radical; Complications—Gastro-	
---	--

CONTENTS.

intestinal Disorder, Hepatic Disorder, Treatment; General Remarks and Directions, - - - - -	358
LECTURE X.	
Pernicious Fever: More Common at the South; Characteristic Symptoms; Condition of the Bowels; Blood; Diagnosis and Prognosis; Prof. Wood's opinions; Treatment; Two indications, produce reaction and prevent subsequent paroxysm; Concluding Remarks—Prof. Bell's cases and Treatment—Remarks, -	375
LECTURE XI.	
Yellow Fever: History; When and where it prevails; Endemic and Epidemic; Symptoms and Course; Three Stages—1st, Primary Fever—2d, Abatement—3d, Collapse; Its occurrence in Charleston; Its prevalence in Natchez; Description of the town and surrounding country; Description of the Epidemic; Symptoms; General Remarks; Anatomical Character, - - - - -	388
LECTURE XII.	
Yellow Fever continued: Cause, Vegetable and Animal Malaria, Reasons given, Additional Facts; Extracts from Dr. Perlee—Yellow Fever in Natchez in 1817 and 1819; Dr. Dickson on Yellow Fever in Charleston, 1817; Reference to other cases; Circumstances necessary to produce Yellow Fever; Contagiousness discussed; Diagnosis; Prognosis; Treatment; Quinia and Iron; Other Remedies; Remarks on Cathartics, Mercury and Lancet; Convalescence; Means of Prevention; Case Treated by Prof. Morrow; Treatment by Dr. McVoy, by Dr. Thomas, 401	401
LECTURE XIII.	
Typhoid Fever: Preliminary Remarks; Synonyms; Mode of Invasion; Febrile Symptoms; Different Periods of Progress described; Sometimes Periodic; Tympanites; Peculiar Discharges; Rose-colored Eruption; Sudamina; Petechiæ; Subsultus Tendonum; Posture of Patient; Fatal Cases—Mode of Death; Duration; Favorable Result; Convalescence; Sequelæ; Anatomical Phenomena—Characteristic and Occasional, Lungs, Brain, Alimentary Canal—Peyer's Glands, Mucous Membrane—Spleen—Liver, - - - - -	429
LECTURE XIV.	
Cause of Typhoid Fever; Doctrine of Contagion considered; It is Infectious; Difference between Infection and Contagion; Influence of Acclimation, Age, and Sex; Nature of Typhoid; Diagnosis; Prognosis; Treatment; General Remarks, Dr. Jackson's Method, Chomel's, Louis', Statistics, - - - - -	444
LECTURE XV.	
Discussion of Treatment continued: Dr. N. Smith's Method; Review of the Authors cited; Proper Treatment; Remedies Recommended; Cases cited; Typhoid may be cut short; Further Measures for Protracted Cases; Management of Convalescence, - - - - -	460
LOCAL DISEASES.	
LECTURE XVI.	
Inflammation: Definition; Symptoms; Changes produced, Functional, Structural; Causes; Nature; Results or Terminations; Resolution; Effusion; Induration and Adhesion; Hemorrhage; Suppuration; Origin and character of pus; Softening; Ulceration; Gangrene; Granulation; Cicatrization; Summary, -	472

CONTENTS.

LECTURE XVII.

Chronic Inflammation; General Effects of Inflammation on the Blood; Hunter's Opinion; Gendrin's; Buffy Coat; Nervous Influence; Fibrin; Effects of Inflammation beyond its Seat; Sympathetic Fever; Microscopic changes in Inflammation; Contraction of Capillaries; Relaxation; Engorgement; Effusion of Lymph; Quotation from Tweedie, From Hunter, From Magendie, on Capillary Circulation, 490

LECTURE XVIII.

Treatment—Effects of Blood-letting: Magendie's Character and researches, Quotations from him—Blood-letting may cause disease—Bleeding increases Serum—Various Experiments—Excess of Serum embarrasses Capillary Circulation—Promotes Inflammation—Magendie's change of views, Bleeding predisposes to inflammation; Quotation from Hunter; From Tweedie,—Review of his Doctrines; Results of Bloodless practice, - - - - - 510

LECTURE XIX.

Treatment without Bleeding;—Indications—Remove Cause—Equalize Circulation; Attention to Skin; Objection Answered; Hæmastasis—Adjustment of Ligatures; Other Measures, - - - - - 538

LECTURE XX.

Phrenitis or Inflammation: Preliminary remarks; Synonyms; Symptoms—First Stage—Second Stage—Third Stage; Diagnosis; Prognosis; Anatomical Characters; Reference to Phrenology; Further Research urged; Causes—Predisposing—Exciting; Treatment; Obscure Chronic Disease—Case; Neuralgic affections, 539

LECTURE XXI.

Otitis, or Inflammation of the Ear: Diagnostio Symptoms; Predispositions—Causes—Treatment—Local Measures—Constitutional Remedies—Recipes—"Alteratives"—Associated with Malarial Fever—Case of Neuralgia. Stomatitis, or Inflammation of the Mouth: Preliminary Remarks—Never Idiopathic; Symptoms; Causes; Treatment. Thrush, or Infantile Sore Mouth: Symptoms; Treatment; Condition of Mother; Idiosyncrasies; Nurse's Prescriptions. Can-
crum Oris. Nurse's Sore Mouth, - - - - - 554

LECTURE XXII.

Glossitis, or Inflammation of the Tongue: Symptoms; Treatment. Angina, or Inflammation of the Fauces: Variety of Symptoms; Peculiarities; Causes; Treatment; Chronic Form; Treatment. Tonsillitis, or Inflammation of the Tonsils: Symptoms—Local—General; Terminations: Chronic; Prognosis; Cause; Epidemic; Treatment; Strictures on Calomel and Lancet. Œsophagitis, or Inflammation of the Œsophagus; Symptoms; Treatment, - - - - - 570

LECTURE XXIII.

Gastritis: Explanatory Remarks; Two Forms; Acute Gastritis, General Relations; Symptoms, Local—General—Favorable and Unfavorable; Symptoms of Disorganization; Duration; Modification; Pathological Relations; Redness of Mucous Membrane; Legal Investigations; Causes; Treatment, - - - - - 586

LECTURE XXIV.

Chronic Gastritis: Preliminary Remarks; Distinguished from Dyspepsia; Symptoms; Duration; Causes; Treatment—If caused by Over-eating, etc.—If caused by

CONTENTS.

Spirituous Liquors; Active Purgatives to be Avoided. Dyspepsia or Indigestion: Digestive Function considered; Effects of Fluids; Symptoms of Hepatic Disorder; Influence of Irregular Habits; Want of Exercise, etc., - 596

LECTURE XXV.

Indigestion, continued: Treatment; Hygienic Treatment—Food, proper and improper—Fluids not advisable—Exercise; Summary; Medicinal Treatment—Neuralgic cases—Spasm of Stomach, - 607

LECTURE XXVI.

Enteritis: Synonyms; Parts Involved; Symptoms; Diarrhea—Character of Stools—Febrile Symptoms; Prognosis; Post-mortem; Causes: Diagnosis; Treatment for various Causes—Cold—Acid Accumulations—Excessive Bile—Malarial Fever; Diet. Chronic Enteritis: Symptoms; Treatment. Diarrhea: Symptoms; Causes, etc.; Treatment for overloaded bowels; Treatment for Atony, - 617

LECTURE XXVII.

Dysentery: Synonyms; Acute Dysentery; General View; Modifications and Varieties; Symptoms—Local—General; Caused by Worms in Children; Adynamic Form; Associated with Periodic Fever; Prognosis; Causes reviewed; Post-mortem; Treatment—Where caused by cold—By irritating substances—For derangement of Stomach, Emetic—Recipe, Injections; Treatment in late stage; Where caused by Worms; Epidemic Form; Antiperiodic Medicine; Obstinate Cases, - 631

LECTURE XXVIII.

Chronic Dysentery: Symptoms; Constitutional Derangement; Post-mortem; Cause; Treatment—Mild Cases—Ulceration—Diarrhea—Varying Remedies—Prolapsus Ani—Diet. Peritonitis, or Inflammation of the Peritoneum: Preliminary Remarks; Varieties; Acute; Symptoms; Puerperal; Tympanitis; Periodicity; Post-mortem; Cause; Diagnosis; Prognosis; Treatment; Chronic Form; General Remarks; Symptoms; Treatment; Clinical Case of Low Fever, - 646

LECTURE XXIX.

Stricture of the Rectum: Preliminary Remarks; Two Forms; Spasmodic Stricture; Symptoms and Causes; Treatment;—Organic Stricture; Two Varieties; Non-Malignant; Symptoms and Causes; Treatment; Cancerous Formation; Symptoms; Treatment—Radical—Palliative, Hemorrhoids or Piles. Frequency and Importance; Definition; Varieties; Constitutional Condition; Local Development; Primitive Type; Positions of Tumors; Bleeding Piles; Wart-like Excrescences; Diagnosis; Causes; Treatment—Constitutional—Local—Removal by Ligatures—Precautionary Measures, - 664

LECTURE XXX.

Fissure of the Rectum: Description; Appearances; Causes; Treatment—General—Local. Fistula in Ano: Remarks; Causes; Character; Treatment—Local and General. Prolapsus Ani: Character; Symptoms; Cause; Treatment, - 682

LECTURE XXXI.

Colic: Varieties named. Wind Colic: Symptoms; Cause; Treatment. Bilious Colic: Symptoms; Nature; Cause; Fatality; Anatomical Character; Treatment; Particular Remedy—Dioscorea; Remarks; Other Treatment. Painters' or Lead

CONTENTS.

Colic: Distinction; Symptoms; Paralysis; Chronic; Cause; Remarks; Diagnosis; Prognosis; Anatomical Character; Treatment; Prevention, - - - 696

LECTURE XXXII.

Obstruction of the Bowels: General Remarks; Symptoms; Causes; Treatment; Concluding Remarks. Constipation: General Remarks; Symptoms; Causes; Treatment; Case stated; Diet; Treatment of Obstinate Cases, - - - 710

LECTURE XXXIII.

Cholera Morbus: Introductory Remarks; Character; Symptoms; Cause; Predisposition; Anatomical Character; Diagnosis; Treatment, - - - 728

LECTURE XXXIV.

Epidemic Cholera: Introductory Remarks; History; Progress; Appearance in United States; Symptoms of different Stages—First, Choleric Stage—Second, Positive Invasion—Third, Collapse—Fourth, Reaction and Convalescence; Variations; Anomalies; Blood in Cholera; Rice-water Discharges; Anatomical Character; Causes; Predisposing; Exciting, - - - 730

LECTURE XXXV.

Nature of Cholera; Primary Seat; Prognosis; Treatment of different Stages: Treatment of First Stage; Treatment of Second Stage; Treatment of Third Stage; Dr. Morrow's Treatment; Dr. Jordan's Report; Concluding Remarks, - - - 747

LECTURE XXXVI.

Milk-Sickness: Introductory Remarks; Symptoms; Case of Milk-Sickness; Treatment; Character; Cause; Nature; Treatment; Note; Other Cases; Quotation from Dr. Haynes; Dr. McCall's Views; Cause; Treatment, - - - 763

LECTURE XXXVII.

Worms: Remarks; First Variety; Character; Appearance; Situation. Second Variety; Character; Appearance; Situation. Third Variety; Character; Appearance; Situation. Fourth Variety; Character; Appearance; Situation. Fifth Variety; Character; Appearance; Situation. General Symptoms; Origin; Spontaneous; Propagation; Remarks; Anatomical Character; Treatment for Lumbrici and others; Treatment for Tænia; New Remedy, - - - 778

PREFACE TO THE FIRST EDITION.

THE object of the present publication is to supply, in a measure, the increasing demand for a TEXT Book for students, and a work of reference for practitioners of the ECLECTIC School of Medicine. A work embodying at once the general principles, and the modern improvements in practice, advocated by that school, adapted equally to the wants of Western physicians, students, and professors, and calculated to correct and remove erroneous impressions too generally prevalent in regard to the Eclectic system, is, and long has been, greatly needed.

It was to answer these several demands, and promulgate more liberal medical sentiments, that the late lamented Prof. MORROW commenced preparing for the press a work on the Theory and Practice of Medicine. He had made some considerable progress in the discussion of a number of the diseases usually treated of in such a work; but, aside from the incidental mention of principles growing out of the consideration of the treatment of diseases, and before arriving at the formal discussion of the important and distinctive general principles connected with medical improvement, which he had for many years been teaching with eminent ability, he was cut off by the hand of death.

Remote from the field of labor in which Prof. Morrow was engaged, the present writer had no opportunity to consult or arrange with him, or even to ascertain the extent of the matter he had prepared before his decease. But having been his associate in the Eclectic school when first established in Worthington, and his partner in the practice of our profession for many years, it was, perhaps, not unreasonably supposed that I fully understood and appreciated the views and theories of our late friend; and hence, doubtless, it was, that I was immediately called upon, both by *his* friends and the friends of the institution, of which he was the moving spirit up to the time of his death, to take his place in the school, and complete the work which he had begun. However reluctant I might have been to suddenly exchange my own active business, at no small personal sacrifice, for the more quiet, perhaps, but more exhausting labors of a professorship, yet I did not feel at liberty to resist the urgent personal solicitations of too partial friends, nor to decline the appointment, by the trustees of the Eclectic Medical Institute of Cincinnati, to the chair of "Theory and Practice of Medicine."

With health not the most firm, and accustomed to active out-door exercise, I feared the result of the confinement necessary to the *complete* preparation

PREFACE.

course of lectures, and the continuation of Dr. Morrow's work. I therefore resorted to the expedient of procuring a phonetic reporter, to take down and transcribe my lectures, and thereby accomplish, to a great extent, the two-fold purpose of completing the work referred to, and imparting a more thorough course of instruction than I should otherwise be likely to do.

On examining the matter left by Dr. Morrow, it was found much less extensive and more unfinished than was expected; and what he had written was mainly confined, as before stated, to the consideration of the symptoms and treatment of some of the most common diseases, without any separate discussion of the pathological phenomena, or general principles, always important, but indispensably necessary in a work proposing great changes in the Theory and Practice of Medicine. I also found, on reflection, that it was not convenient, in delivering a course of lectures, to continue the plan adopted by Dr. Morrow, nor could I appropriate and embody his matter, without considerable modification. I therefore prepared my lectures independently of his writings, and have concluded to present his matter in this volume, separately, and exactly as it was left by his hand, not feeling authorized either to withhold its publication, or to introduce any other changes than were required by evident verbal omissions or mistakes. This much was, perhaps, due to the memory of the late Professor, and will be gratifying to his numerous friends, who had been apprised of his intention to prepare a work for the press. And this will account for the appearance of the present volume, which, I trust, will meet the expectations of the profession, and supply, at the same time, the present necessities of our schools.

It will be seen that there is some difference between the course of treatment of malarial diseases recommended by Dr. Morrow and that advocated in these lectures. The views which I have set forth of malarial influences, and the treatment of all diseases arising therefrom, have been gradually ripening into settled convictions during the last eighteen years, and are the result of personal observation and experience. They were not till recently communicated to Dr. Morrow or the profession, and not till after he had mainly written what appears in this book. But I have reason to believe, from several interviews with him, that, after fully testing the theories and measures which I suggested to him, he would, had he lived to complete his work, have modified his previously prepared manuscript so as to correspond and harmonize with the views set forth in these lectures. In every other respect, it will be observed that our views of treatment are essentially the same.*

On reviewing the manuscript furnished by my reporter, many defects and mistakes were found, partly referable to the difficulty of reporting extem-

*In accordance with the intention of Prof. Jones, frequently expressed, the posthumous writings of Prof. Morrow have been omitted in this edition, but where any important peculiarity of views was entertained by Prof. M., a note of the fact will be found in the proper place.

PREFACE.

poraneous lectures, but mainly owing to the imperfections of the phonetic system, or the want of experience in writing on medical subjects on the part of the reporter. They have, however, been corrected, so far as the circumstances connected with an extensive daily practice would permit; and although I make no claim to exemption from errors and mistakes, I nevertheless believe this work will be found, on the whole, as perfect in these respects as most other similar productions. In a future edition, should any be demanded, no pains will be spared to correct any errors of omission or commission which may be discovered on a more careful review.

My first design contemplated but one volume; but it was found that the proper discussion of all the subjects legitimately embraced in the terms "Theory and Practice," would swell a single volume, however condensed, to a size inconvenient both to students and practitioners. I have, therefore, hastened to issue the present volume in time to furnish a text-book to be used during the ensuing course of lectures in our institutions, and hope to have the second volume ready by the time the subjects treated upon in this volume shall have been gone over in those institutions.

As to the character of the work, it does not become me to speak. I may say, however, that it contains a faithful record of the results of an experience extending through a quarter of a century—a daily experience in the treatment of nearly every variety of disease incident to the human family, in the valley of a Western river, midway between a northern and a southern climate, where the diseases of both are often seen, and both occasionally in the most malignant types. Such a record, it seems to me, is worthy a candid consideration.

Although the work has been produced more especially at the instance of those favoring the claims of the Eclectic branch of the medical fraternity, I nevertheless invite an examination by the profession at large. I can not expect those who differ widely from me to adopt my views at once, nor do I desire to impose the results of my own experience upon *any* member of the profession, without a patient analysis and careful examination; *that*, however, I have a right to expect, in this age of progress and improvement, from all who are able to rise above the influence of professional pride and sectarian bigotry, and with whom the real advancement of the science, and the well-being of the race, are more than paramount to considerations of interest and arbitrary professional ethics. If the principles herein taught, and the practice herein claimed to be successful, after being faithfully and impartially tested by the lights of science and at the bedside of the sick, shall prove to be erroneous and deceptive, then this work would deserve to be denounced, and its errors published to the world. But should the success of its teachings prove equal to its claims—should the work itself be found to contribute any thing of value to the stock of medical science and practice—I ask, in all candor, if it should not be acknowledged? Even if the individual rights of the author are neglected—if his reputation as a bene-

PREFACE.

tor of the race is not to be considered—yet, do not the great and paramount claims of diseased and suffering humanity, require as well the practical test as the open admission of the merits of the work?

If the practice recommended in this work were the result of mere theory, or the suggestion of a "closet practitioner," its claims would rest upon a very different foundation. But since it is supported by the authority of a long and arduous experience, in an unceasing practice, tested in thousands of cases, and rigorously compared with a different course of medication, more particularly in the treatment of malarial diseases, it presents a claim for an impartial trial not always found. My conclusions were not wholesale original assumptions, followed by tests which it was guessed or hoped would produce the preconceived effects; they were rather the result of careful experiment and close observation, made, in the first place, by slight variations from routine practice, and repeated in many subsequent cases, with increasing boldness, and in a less limited and restricted application, until, step by step, the principles of the new mode of treatment, in malarial diseases, at least, were clearly established and triumphantly demonstrated; and this, too, in thousands of cases of almost every conceivable grade, from the slightest intermittent to the most malignant congestive and bilious fevers.

No further apology or explanation, I think, is needed for the appearance of this work. And I now submit it to the public, trusting to the candor of those who have repeatedly called for its publication, and to the high-toned moral integrity of a large majority of the profession, to do it justice; remarking, however, that, if in this I am destined to be disappointed, I believe, with an undoubting faith, that a generation is yet to come, of loftier and more liberal sentiments, of deeper sympathies with the whole human race, and freer from the trammels of sectarian pride, which shall be ready to award to truth its full demands.

It remains only to acknowledge my obligations to various medical authors and publications, used and referred to in the preparation of these lectures. I especially acknowledge my indebtedness to the lectures of Doctors Armstrong, Watson, and Stokes & Bell, on the practice of medicine; to several medical journals and retrospects for isolated facts—such as the Boston Medical and Surgical Journal, etc.; to the works of Magendie, Vogel, Schomel, Gross, John Hunter, and others, on pathological phenomena; to the voluminous works of Dr. Tweedie; to the extensive Modern Practice of Prof. Wood, of the University of Pennsylvania; and to Doctors Meigs, Condie, and Chapman. I am also under great obligations to Prof. W. Sherwood, of the Eclectic School at Cincinnati, for his valuable assistance in copying and preparing the work for the press.

LECTURES

ON THE

THEORY AND PRACTICE OF MEDICINE.

INTRODUCTORY LECTURE BY PROF. JONES.

GENTLEMEN—

Your attention is invited this morning to a general view of the extensive and important subjects pertaining to this chair. The *Theory and Practice of Medicine* is a title defined to some extent by its own terms; yet, neither the mere enunciation of the phrase, nor attention to the literal signification of the words composing it, will convey an adequate idea of the subject which it comprehends.

The Lectures to which you will listen as delivered from this chair, will have for their object your instruction in correct *Theory*, or those doctrines which, appearing to coincide with philosophical truth, are sustained and confirmed by experiment and observation, in health, in disease, and post-mortem research; and the elucidation and illustration of a system of practice believed to be rational in its basis, truly scientific in its measures, and which has proven eminently successful in its results. And, rest assured, gentlemen, I feel most sensibly the responsibility of my position. The duties of a professor, occupying this chair, are laborious and extensive, and must tax, to their utmost capacity, the abilities of even the most giant intellect, however qualified for the task by study and experience. But were labor, physical and mental, all that is involved in the assumption of such a position, it were, comparatively, a matter of minor importance; the professor might perform his task with fidelity, and having accomplished "as the hireling his day," feel no further concern.

But when I reflect upon the consequences which will flow from my labors in this capacity; on the results, for good or evil, which will follow every Lecture; when I realize that by assuming the

INTRODUCTORY.

sation of a teacher, whatever of error may still attach to my Theory and Practice will be multiplied by the number of my pupils, that by misunderstanding or misapplying the facts taught by philosophy and by experience, I may mislead you, and send you forth among my fellow-men, under the guidance of false doctrine, and armed with the means of death, to curse my fellow-men by magnifying their sufferings and shortening their days, I certainly tremble under the weight of my moral responsibility. But when, on the other hand, I recur to the past, and recall the tedious months and years through which, as an individual, I struggled on under doubts and perplexities; when I remember cases in which it is highly probable life was lost through my early errors, derived though they were from the highest professional authority; when I call to mind the satisfactory results which have attended my professional labors, since the adoption of my present views in regard both to theoretical and practical medicine, I can not, as I do not desire to, repress a feeling of confidence that my labors in this chair will not be in vain, if they enable you to commence your medical career, free from many of the errors which embarrassed my early practice; and while they will save you the perplexity and mortification, with much of the labor, which truths gained by experience so often cost, they will shield your patrons from the dangers to which they would have been exposed had you been left to discover, as my colleagues and myself have done, the fatal errors which, under the semblance of science, and associated with truth, are inculcated by medical authorities.

I would not be understood as claiming for the system of medicine which will be set forth in these Lectures, that it embraces all that can or should be known in Pathology and Therapeutics. I do not even claim that the doctrines taught will be entirely free from error; but I do honestly believe that the experience of my fellow-laborers and myself in the department of Medical Reform, for the last thirty years, has resulted in the discovery and addition to the common stock of scientific truth, of a large amount of facts and improvements, and in detecting and exposing a great number of errors in Theory, and abuses in Practice, which, associated as they were with, and disguised under the semblance of truth and science, had escaped detection by our predecessors. I may, with safety, add, also, that while the improvements thus made in scientific medicine are radical and obvious to the unprejudiced observer, they are of a character which would have been forever overlooked by

INTRODUCTORY.

self-inflated professional pride, and could never have been developed by the modes and means of research which the spirit and authority of assuming and illiberal conservatism would have been competent or willing to suggest. But though our modes of research have been, by self-constituted censors, declared to be erratic and "irregular," and though the field of nature, by us explored, had been almost forsaken by them and their followers, and its resources treated with contempt, yet the revolution which is now in irresistible progress throughout the profession, is so unequivocally distinguished by the improvements introduced, and the spirit of independence and liberality propagated by the reformatory rebels against the conservative hierarchy, that very soon we may expect to see a republic in medicine, established upon the broad basis of experimental science, laid by liberal minded and earnest philanthropists, and appreciated and admired by an intelligent and enlightened community.

Would we run over the pages of medical history, we should find that nearly all we know, of any practical utility in the treatment of disease, has been developed by experiment, and introduced in opposition to prevailing prejudices. We should be impressed, also, with the tardy progress which this department of human knowledge has exhibited, especially in modern times, as compared with that of almost every other. I speak now of the special department of practical medicine.

This branch of medical science probably preceded every other in point of time; that is, before any researches had been made in Anatomy, Physiology, Chemistry, or the like, man had been led by observation and experience to adopt certain measures to relieve pain and obviate disease; so that without doubt, practical medicine had its origin in experiments, prompted by necessity, and grew into the character of a science under the culture of observation and experience. Although on this subject we have no resource but rational conjecture; yet from the manifest circumstances of the case, there can be little doubt that such were the beginnings and early characteristics of the healing art.

The first annotations of our science found on the page of history are very obscure, but enough can be made out to denote that the practice of medicine was at a very early period in the hands of the priests, who were also the chief repositories of every other department of learning. The Egyptian priests associated the healing art with the mysteries of mythological religion, and while they

INTRODUCTORY.

ably employed very simple medicinal agents, their use was accompanied by various magical incantations, by which the imaginations of their patients were impressed, and to which were attributed, with some measure of truth, the cures which were effected. The same appears to be true of the early history of medicine in Assyria. This monopoly of learning by a particular class, and that class receiving their office by inheritance, was not favorable to the rapid development of truth, and of course the progress of medical science under such circumstances was extremely slow.

According to Grecian history, *Æsculapius* appears to have been the first to devote himself to the pursuit of medical science as a profession, but so closely were the ideas of medicine and religion associated in the minds of his countrymen, that the record of his life and discoveries is almost inseparably interwoven with the mythological fables of early Grecian story. He was deified after his death, and temples erected to his service. The priests of these temples succeeded to the titular honors of the profession, and perpetuated the prejudices which connected the treatment of disease with religious rites and ceremonies, and thereby retained the influence which mystery and superstition place in the hands of those who happen to be regarded as superiors. But these temples of *Æsculapius* became the means of promoting the progress of medicine, by affording their priests ample opportunity to observe and make experiments on disease in its various forms, as presented by the vast numbers which their reputation attracted to their altars; and when subsequently the records of these temples became accessible to the votaries of science, they proved a source of much valuable information.

After the lapse of ages, in which the healing art was thus appropriated by an idolatrous priesthood, to increase their influence and sustain their authority over the minds and bodies of mankind, a new order of things began to be introduced. Reforms began to make their impression on the various departments of human affairs, as a spirit of general inquiry seemed to gain influence among mankind. The dawning of that comparatively bright period, in which the republic of Greece flourished, was also a new era in the history of medicine. Individuals of energy, industry, and learning, began to devote themselves exclusively to researches into the laws of health and of disease, and to the discovery of remedial agents.

Hippocrates was so truly the first medical reformer, and the revolution he wrought in isolating the practice of medicine, and trans-

INTRODUCTORY.

mitting it to his successors in the form of a distinct science, was so great, that he has been universally awarded the appellation of Father of Medicine. He was a descendant of *Æsculapius*, but had imbibed the sentiments of *Pythagoras*, in opposition to the secretaries of the *Asclepiadæ*, and thus combined the advantage of a practical medical education in an *Æsculapian* temple, with the independent, free and vigorous character of a liberal minded philosopher. And, although we find his theories partake of the errors and crudities of that early day, it is remarkable that he had always the sagacity to perceive where clinical observations contradicted his philosophy, and to follow experiment rather than hypothesis. Hence, he was a true Eclectic, a rational Empiric, if you please, and the head of the long list of public benefactors who have successfully labored to wrest practical medicine from the hands of mystical usurpers, and, pruning it from error and false theory, place its study upon the only correct basis, that of patient experimental research, and clinical observation. He was a careful observer of all the circumstances connected with human diseases. The influence of atmospheric changes, of season, and of climate, in the production and modification of disease, attracted his attention, and his observations thereon have come down to our day. His general descriptions of diseases are still recognized in many instances as remarkably correct; and his views have always been treated with respect, and some of them are regarded as true expositions of medical philosophy at the present day.

It would be interesting and instructive to follow down the history of medicine, and observe the changes which were wrought in its doctrines and practice by the numerous individuals who have been prominent in the profession, and by the various sects or schools into which that profession has been successively divided. But the points to be presented in this Lecture, according to the plan I have marked out for myself, will not allow time for even an enumeration of the names of persons and of parties which illustrate the historic pages of medical science. I have merely adverted to the subject for the purpose of showing that medicine, as a science, had its birth in a revolution against exclusivism, assumption, and blind superstition. And should you hereafter, as I strongly hope you will, make yourselves familiar with medical history, you will discover that during every period of the world, from the days of *Hippocrates* to the present time, and in every country where science has been at all cultivated, the medical profession has been continually

INTRODUCTORY.

gitated by discussions, not only as to philosophical doctrines and practical measures, but also as to the claims of certain sects to the exclusive honors of the profession, which claims you will generally find to have been based upon their adherence to the teachings of Hippocrates, or of some other celebrated reformer, whose particular star happened at the time to be in the ascendant.

In prosecuting your historical researches, you will find, for instance, that through a lapse of centuries the profession was divided about equally among the Dogmatists, who made Theory the only basis of legitimate Practice; and the Empirics, who professed to discard Theory, and be governed by experience alone. And you will observe, also, that both these sects claimed, and that with truth, to have derived their doctrines from Hippocrates himself. The Father of Medicine did reduce medicine, in some degree, to the character of a theoretical system, but his Theory was based upon observation, and he spent his life in correcting it by experience; so that while these two sects were about equally descended from the great founder, neither one nor the other was entitled to set up the claim of exclusive legitimacy. And as they, in the heat of controversy, drove each other to opposite extremes, and were both entrenched midway between error and truth, you will observe that the middle ground of Theory and Experiment combined, remained unclaimed by either, although in practice occupied by both. And you will find that as science and the arts were cultivated, and the human mind expanded, this great discrepancy, in the doctrines of the contending parties, became so manifest as to invite a third party into the field. This was the party of the Methodics, who, by selecting in a truly Eclectic spirit, the truth from both extremes, and leaving the Ultraists to cherish and sustain their errors, became really the representative of Hippocrates, or, in other words, of reformatory and rational medical science.

When, in your review of medical history, you shall have passed the dark ages, you will find medicine, with other departments of human knowledge, presenting a scholastic aspect, and mere theorists assuming the titles, the dignities, and the honors of the medical profession, in contradistinction to all who ventured to cleave to nature and be governed by personal observation and practical experience. And here you will discover a reproduction of the old parties—the Dogmatists and the Empirics—in spirit and in fact, though not in name; and here again you will observe the necessity of an Eclectic reform to concentrate the truth and

INTRODUCTORY.

separate it from error. As is always the case, the vacuum was once filled. Boerhaave, with his sound judgment, his cultivated intellect and weight of moral character was the man for the occasion; and he, in the spirit of a true Eclectic, attempted to bring order out of chaos, and give the world a system of rational and practical medicine. He was not, however, sufficiently divested of reverence for antique theories; he took more upon credit or the indorsement of authority than he should have done. Hence, you will not fail to observe, that although he exerted a controlling and highly beneficent influence over the profession, which is felt even in our own times, yet he failed to settle certain important points of controversy, which, with others that have incidentally risen, have kept the ranks of medicine in a state of constant agitation.

The controversies of different authors and of rival medical institutions, form indeed a large portion of medical history since the revival of letters; and while, in the true spirit of European aristocracy and pedantry, the highest claims to the homage of mankind have been set up by those who assumed the title of *professors*, as if their theories were all oracular, and never to be called in question, the grossest contradictions and the most humiliating inconsistencies have been published as incontrovertible truth, and defended respectively by their friends; all equally claiming exclusive legitimacy, with a zeal and rancor only equalled by the malignity with which they have resisted the claims of the laity to examine these questions for themselves. The temples of *Æsculapius* have in fact been rebuilt in these latter days of reform, and their priests, assuming to possess and retain all medical knowledge, which they offer to reveal to novitiates, upon consideration of exorbitant fees, have, nevertheless, lacked the uniting spirit of the god of physic; and while each temple has been occupied, as a kind of Babel, to exclude the rising tide of enlightened and reformatory public sentiment, they have all been used, at the same time, as forts and batteries for the prosecution and maintenance of hostilities between the authors or adherents of different medical tenets.

How much respect is due to a claim of exclusive professional legitimacy, when the claimants can at no time agree among themselves? And who can feel safe in acknowledging allegiance to an assuming hierarchy, or rely with unquestioning trust on its doctrines, when those doctrines have no more stability than the sand on the ocean beach? To show that this is not an unfounded insinuation, I read an extract from unquestioned history (*Bostock*):

INTRODUCTORY.

"At the termination of the last century, while the doctrine of Cullen was generally embraced, typhus fever was called a disease of debility, and was of course to be cured by tonics and stimulants. No sooner was it ascertained to exist, than bark and wine were administered in as large doses as the patient could be induced, or was found able to take. No doubt was entertained of their power over the disease; the only question that caused any doubt in the mind of the practitioner was, whether the patient could bear the quantity that would be necessary for the cure.

"To this treatment succeeded that of cold affusion. The high character and literary reputation of the individual who proposed this remedy, its simplicity and easy application, the candid spirit which was manifested, and the strong testimonials which were adduced by his contemporaries, bore down all opposition, and we flattered ourselves that we had at length subdued the formidable monster. But we were doomed to experience the ordinary process of disappointment; the practice, as usual, was found inefficient or injurious, and it was, after a short time, supplanted by the use of the lancet. But this practice was even more short-lived than either of its predecessors; and thus, in a space of less than forty years, we have gone through three revolutions of opinion with respect to our treatment of a disease of very frequent occurrence, and of the most decisive and urgent symptoms."

But while thus mutation and revolution stand forth so conspicuous in the history of the science, we have the most clear and conclusive evidence of the empirical and routine practice, connected with the reign of each, that can possibly be desired; thus showing the more than autocratic influence of the leaders upon the throng. In what system of medical practice, or in what newspaper puff or empirical advertisement, can we find greater uniformity of remedies or sameness of practice, as far as what is considered the essential agents are concerned in the treatment of disease, than is to be found in the leading and standard works of the now waning system of practical medicine—a system which, though it be recited in classic style, mixed up with the varied learning of its authors, and beclouded with all the qualifications of supposed conditions and attendant symptoms, yet, when stripped of its gaudy plumage, and shown in its nakedness and truth, will exhibit a more universal application of a single remedy for all the "ills that flesh is heir to," than can be found in any system considered of an irregular character. Look through the long catalogue of diseases, and you will

INTRODUCTORY.

find one remedy prescribed for nearly all of them, especially for diseases of children. If it is jaundice, as a matter of course, a small portion of calomel must be taken; if your child has irritation of the bowels, from teething, no remedy can as speedily divert it, by setting up a similar action in the liver, as calomel; if costiveness is found to exist, it is dependent on biliary derangement, and no other remedy will reach that organ but calomel.

If remittent fever, the universal teaching is, that the patient is bilious and mercury is the specific.

If congestive fever, nothing will unlock the portal circulation equal to calomel, and your case is fatal without it.

If it be catarrhal fever, a more searching remedy for diseases of mucous membranes can not be found, and calomel must be given.

In nearly the entire range of eruptive fevers, without any attempt at explanation, we are advised to administer calomel.

In typhoid fever, its substituting influence must be brought to bear on the case, by way of slight salivation, or the patient is in danger.

Whooping cough can be greatly modified by repeated small doses of calomel.

In short, if it is not recommended, it is the exception to the rule; while the principle that runs through the whole is to administer calomel. Where, I ask, can be found a more systematic routine, or who can describe a more irrational practice? Fidelity to a single empirical remedy is the unbending rule, while the purity of faith is belief in its use.

It has, in short, become the only test of respectability and standing, that you are constantly in the habit of administering calomel. By it, you are adjudged worthy or otherwise of professional courtesy, and by it, alone, will you be admitted or rejected from social communion with the members of the profession.

Professional or scientific attainments are not made the subject of inquiry, nor the moral character of the individual taken into the account, in the consideration of credentials for membership in the medical conventions; while the profoundly ignorant of real science, the clod-hopper of yesterday, and the dregs of immorality and crime, are admitted to full communion, if they but acknowledge their fidelity to the one empirical remedy.

It matters not that they have never seen the inside of an institution of learning, or have never witnessed an anatomical demonstration, or heard from the lips of their high priests a single lec-

INTRODUCTORY.

are; if they are not suspected of infidelity on the subject of calomel, they are offered, at once, the right hand of fellowship.

While on the contrary, though a man's acquirements are of the first order, literary and medical; bearing his credentials from the best institutions of our country, of their own faith even, and possessed of all the moral qualities of a gentleman and a Christian; if he is not true to the faith, he can have no admittance. He is branded with "*quack*" by the fraternity, and thrust from among them.

Are these things right? Are they befitting a liberal and honorable profession? The good sense of every intelligent mind will answer in the negative. The progress of medical science is retarded and the lives of community are sacrificed on the altar of professional ethics, enacted for personal considerations and pecuniary interests.

"All men are created free and *equal*" is a declaration worthy of universal remembrance, and shall we be told that this physician or that one shall dictate whom we shall employ when sick? Or that if we see fit to send for another, without his approbation, he will withdraw from the case and refuse to have any thing to do with it, and forever thereafter exhibit the scorn and neglect of one whom otherwise we might have regarded as a friend and companion?

Such being the high claims of "regular" medicine, and such the unstable character of its most prominent doctrines and measures, is it at all surprising that suspicions, and distrust, and a desire to investigate these claims, should be manifested in an enlightened community? It could not be otherwise; more especially when the spirit of European professional arrogance and assumption was imported to this country, with all its selfish rancor and venom, as the *Æsculapian* deity was carried from Greece to Rome in the form of a *serpent*. And when it was attempted to erect the temples of medical idolatry and set up the doctrine of the divine right to legitimacy, on this soil consecrated to freedom and equality, it could not be otherwise than that an American people should not only resist the assumptions, but pry into and expose the fallacies and inconsistencies of the despotic system of medicine. And it was a necessary consequence that the attempt to exact homage for theories wearing the guise of learning, and to enforce obedience to formulæ dressed in the costume of antiquity, should have produced a reaction which tended to inspire contempt for scholastic science, and to the rejection of the entire system of "old physic."

INTRODUCTORY.

All who have been observers of the position of medical parties in this country during the last forty years, must be struck with the fact that the results just now hastily sketched have actually occurred. Never in the history of medicine have contending parties occupied such extremes, as have the adherents of "regular" medicine and the ultra reformers, the "Botanics," during the half century just closed. On the one side it was claimed, not only that learning is requisite to the medical practitioner, but that this learning must be gained in a particular way, and under the auspices of certain legitimate institutions. On the other, all scientific education was discarded as unnecessary, and the right of every individual to practice medicine was claimed to be as unrestricted as his privilege to cultivate the soil. One party made certain irritating and poisonous minerals the leading articles of the *materia medica*, almost to the practical exclusion of vegetable agents, and contended for the lancet with a zeal which nearly cut off ordinary hygienic measures; the other rejected all minerals, insisted that the vegetable kingdom supplied us with all needed medicines, and that with these, the bath tub, and steaming apparatus, any intelligent and energetic person might assume to grapple with disease in all its forms; deprecating and discarding the extraction of blood either generally or topically.

Here again is presented the middle ground of truth between the two extremes, and here, once more, has the spirit of Eclecticism, of rational reform, summoned her votaries and displayed her ensign. And, as Hippocrates opened out the records of the *Æsculapian* temple to the inspection of the world; as the Methodics in their day, and Boerhaave in his, culled truth from both extremes; so now does the Eclectic branch of the medical profession seek to gather truth from every source, from the aristocratic and the peasant practitioner, from their predecessors and contemporaries; and to enrich their store of remedies with valuable agents from every kingdom of nature; rejecting only such agents and condemning only such measures as sound philosophy and practical experience have demonstrated to be both hazardous and unnecessary.

We claim the confidence of community for an enlightened selection from all available sources, of every measure, which observation and experience shall prove safe and efficient in the cure of disease.

This we profess to do *without prejudice*, and without fear or favor,

INTRODUCTORY.

with an open and frank avowal that we spare no pains or expense within our reach to secure the object sought.

Whatever humiliating associations may be connected with the achievement of the measure to be accomplished, or whatever of contumely may be cast upon us by "*Old Physic*" or its supporters, we have steadily persevered in this course, and the result is known to those who have sought to be informed.

We claim safer and more efficient substitutes for that "*Sampson of the materia medica*," that panacea of human maladies—Mercury, in its different preparations. We claim, also, to have made large contributions to the materia medica, of new and important agents not before known, and to have essentially modified the application of many old ones to subserve more valuable and important purposes in the treatment of disease.

We claim to demonstrate, beyond a chance for cavil, a more successful result in those inflammatory diseases for which the lancet is unsheathed, and the loss of the vital fluid is considered the *sine qua non*.

"We affirm that bleeding is a barbarous and unscientific remedy, and deny that it is ever necessary. In this matter we take our stand upon the facts recognized by the highest authorities in medical literature. We refer to the most recent and accurate researches in Chemistry and Pathology—to the experimental investigations of Andral, Magendie, Louis, Simon, and many others, which have settled, beyond all doubt, and placed among the permanent facts of medical science, to be received by all medical schools of whatever Therapeutic faith, the phenomena of the blood, when its composition has been affected by hemorrhage, by bleeding and by various other agencies.

"It is indisputably established that bleeding produces a special change in the composition of the blood. The change which it produces is not a removal of any effete or morbid material—not a removal of any element which tends to create or aggravate disease, but a removal of the most necessary and healthy portion, upon the presence of which we depend for the maintenance of health and vigor. Bleeding inevitably reduces the red or globulous portion of the blood, because it removes or destroys a certain amount of the red globules, and the loss which it produces is readily supplied by absorption of water and of comparatively crude materials, while the highly organized globules are regenerated with great slowness and difficulty.

INTRODUCTORY.

"It is a well established fact that the red globules of the blood are essential to life, and that their abundance or scarcity is a criterion of the vital force and activity of the constitution. As the proportion of the red globules increases, the general vital power rises, and the activity or energy of all the organs increases; while a diminution of their ratio enfeebles or disorders the various organs, and predisposes to nervous and tuberculous disorders, and to the whole range of adynamic and cachectic diseases. If the ratio is diminished as much as one-seventh, general debility is the consequence, predisposing to disease, and diminishing the power of recovery; if as much as one-fourth or more, this reduction of vital power is incompatible with health, and inevitably results in some form of disorder.

"Is it not, then, exquisitely absurd to adopt, as a remedy in disease, a measure which, even in the most vigorous health tends directly, with rigorous precision, to destroy the vital powers, and *bring on disease*? Yet this measure has been, and still is sustained by many medical men, although clinical experience, as well as chemical science, has shown its injurious effects, and thousands in America and Europe have been, and are now demonstrating, that all forms of disease may be better treated without blood-letting than with it."*

We claim to have discovered important truths in the treatment of many diseases not taught in the books, nor disseminated from the college halls.

We claim to have made distinctions in the character of a number of diseases of the most vital importance, and adapted remedies to meet the character of each.

We claim also to have made important discoveries in surgical practice, by which many diseases heretofore considered incurable, without a formidable operation, and oftentimes incurable with it, are readily cured; thus saving to the patient great suffering and distress, and at the same time perhaps an important member.

And we claim that our graduates enjoy as thorough scientific advantages as those of any other college in the country, and are therefore entitled to the confidence of community.

In short, we claim as high respectability of character, and as thorough scientific acquirements in our profession; far safer remedial appliances, and many new agencies in disease; more success-

* Buchanan's Introductory Lecture.

INTRODUCTORY.

ful results in practice; new views of Therapeutic medicine, and important improvements connected therewith, to so great an extent, that if the old and new system of medical practice were placed in juxtaposition, a striking contrast would be observed in all their leading features.

Such, gentlemen, is the position of parties in the medical world at the present time, and it is doubtless because you have surveyed the ground and appreciated the advantages presented by the position and resources, and approved the doctrines and liberal spirit of the American Eclectic branch of practical medicine, that you have entered the halls of an institution which proposes to teach those doctrines and inculcate that spirit. You come, I trust, impelled by an ardent desire for truth, and imbued at the same time with the indomitable spirit of American freemen, ready to hear and examine for yourselves, and having found the truth, to appropriate and disseminate it, fearless alike of the scorn or wrath of arrogant pedantry or self-conceited and assuming ignorance. You will commence your medical career early in the progress of American Eclecticism, and when, like the lamented MORROW,—whose decease has created the vacancy which I, his former partner and co-laborer, have been called to fill,—the pioneers of this revolution shall all have passed to that

———"country from whose bourne
No traveler returns,"

it will devolve upon you to occupy their places, to sustain the cause of liberal, scientific and rational medicine, and to illustrate, by your learning, your wisdom and your virtues, that freedom of thought and liberality of spirit are perfectly consonant with the utmost scientific, intellectual and moral development.

In attempting to shadow forth an outline of the course of lectures I propose to deliver, I must of necessity be very brief. To narrow down the scope of a course of lectures on the Theory and Practice of Medicine to the strict limits of these subjects, is perhaps impracticable. So essential is an acquaintance with Anatomy and Physiology, to an understanding of the nature and indications of disease, that constant reference to the subjects embraced by those departments is unavoidable. I would therefore urge it upon you to devote especial attention to those two branches. Therapeutics and the Materia Medica are also intimately connected with this department, and even a knowledge of Chemistry is indispensable to him who desires to master the subject of practical

INTRODUCTORY.

medicine. Surgery and Physic have long been separated in the Old World, and the distinction is in some measure obtaining in the New. This, however, ought not to be, for the surgeon should unquestionably possess a general familiarity with every form of disease, and with all the resources requisite to their treatment, while the treatment of surgical diseases, beyond the mechanical manipulations of surgery proper, falls within the purview of the general principles, without a knowledge of which no man can safely undertake the treatment of disease. In this country, both branches are generally united in practice, although the subjects are consigned to different chairs in the course of collegiate instruction. To my colleagues I must therefore refer you for information in all these departments of our profession, and shall, as far as possible in referring to them, avoid stopping to explain the facts involved, taking it for granted that you have been or will be thoroughly instructed therein.

With a view to facilitate the acquisition of any branch of knowledge it is important that a judicious classification of the subjects embraced should be made. Hence, writers on the various sciences and departments of human knowledge have devoted much attention to the systematic arrangement of the topics upon which they have been employed. Efforts of this kind have not been wanting in medicine. Cullen made the first attempt at the classification of diseases, and his *Nosology*, like the other productions of that practical man, did much to simplify the subject of medicine. Good's *Nosology* followed that of Cullen. He arranged diseases into 6 classes, 22 orders, 121 genera, and 464 species. His classification is too ideal, and impracticable, requiring months of study to enable the student to remember it, and a much longer time to comprehend the fancied similarities upon which the grouping of diseases is made to depend. The only object of classification is the more easy elucidation of diseases and to aid the memory by association, but that of Good really obscures the subject and unnecessarily burdens the memory. Dr. Chapman's classification has reference to the different systems of the body, and he treats of disease under the heads of Diseases of the Circulatory System, Alimentary System, etc. This is a great improvement on the former system, yet it does not appear to me adapted to the elucidation of the subject in the form of oral lectures.

I shall not attempt a systematic classification of diseases, but leave myself at liberty to vary my course as circumstances may

INTRODUCTORY.

seem to suggest; in which way I shall be able to give my lectures, in some measure, the character of a clinical course. I shall, however, observe a general arrangement, as far as convenient, in view of the above suggestion, by which diseases will in the first place be grouped together in obedience to certain general and manifest outlines, as Idiopathic Fevers, Inflammation and Inflammatory diseases, Exanthematous diseases, etc.

In treating of diseases, a general distinction will be made between their acute and chronic form; and in discussing diseases of a local character they will be taken in the order indicated by proximity or relation of the parts involved. Thus: in treating of local inflammation, that of the head will be first discussed, then that of the ear, mouth, tongue, throat, cesophagus, stomach, etc.

In the consideration of each group of diseases I shall endeavor to present and elucidate such general principles as are involved in the course of symptoms which characterizes it, and the principal indications to be fulfilled, together with the complications and anomalous phenomena which have been occasionally encountered; and in considering individual diseases those general principles will be reduced to practical application; the most approved remedies for each indication will be given, and such recipes and formulæ announced as have been found by experience of benefit under the circumstances.

I shall close the present lecture with some brief suggestions in regard to some of the circumstances which it is necessary to consider in the investigation of disease generally.

The first thing in point of importance for a physician to ascertain, when called upon to prescribe, is the nature of the difficulty; in other words, what disease he has to treat. The old adage will apply here: "Find before bind." By this I do not mean that he must of necessity be able to give a specific name to the affection, but that the true nature of the morbid condition should be comprehended. The second important consideration is in regard to the origin or producing cause of the disease.

As tending to cast light upon the subject of disease, its cause and appropriate management, it is important also to inquire into the history of the case, how long since it commenced; the character of the early symptoms; what were the previous habits of the patient, etc.

The age of the patient is often an important point to be considered in the investigation. Some diseases are almost peculiar to

INTRODUCTORY.

certain ages. Hence, where you find the symptoms of a disease not generally occurring in persons of the age of your patient, the opinion, which would otherwise have been formed from the symptoms, will be at least weakened, if not precluded. You would at least be led to look further and ascertain whether the symptoms observed may not belong also to some other disease.

The sex of your patient will very frequently modify your opinions and your treatment. Any hereditary tendency, which may be derived from the family history, in connection with present developments, such as enlarged or indurated glands, etc., and any acquired predisposition of the individual, as indicated by his habits of life, place of residence, former diseases, etc., are subjects of very great interest to the practical and scrutinizing physician, and will by such never be overlooked. Temperament, also, will aid in forming correct opinions in regard to disease and its symptoms. Cheerfulness, for instance, is generally a favorable symptom, but the sudden exhibition of vivacity, by a person of habitual melancholy, might, under certain circumstances, be a very unfavorable omen. Idiosyncrasy, and other peculiarities of constitution, should be known to the physician, where the patient has any, as a knowledge of such characteristics will not only affect the diagnosis, but very often materially vary the treatment. A red or a furred tongue may be habitual with an individual in health; hence you would not, if aware of this fact, decide that he had irritation of the stomach when his tongue was red, nor that his stomach was deranged by accumulation, when his tongue was furred; these symptoms, generally reliable, would need confirmation by other phenomena in such a case. Some individuals can not safely take an emetic; others will not bear opium in any form, and so on, and the physician who prescribes without learning whether such peculiarities have been observed in his patient, runs the risk of being disappointed in the operations of his medicine, at least, and serious consequences might be the result.

Where doubt exists in the mind of the physician in regard to the nature or extent of morbid conditions, he should resort to the various methods of investigation which will hereafter be explained, and examine *separately* every organ in the body: as, the stomach, and the tongue as an index to the stomach; the liver, by means of the evacuations, the skin, the eyes, and by pressure upon it; the bowels, by pressure upon them, and by the discharges from them; the lungs, by percussion and auscultation; the heart, by lis-

INTRODUCTORY.

kening to its sounds, and observing the pulse, whether regular or irregular, full or small, frequent or slow, etc.

As my hour is almost expired, I shall not attempt to proceed further in these general remarks. What I have said, and what I should further say in this relation, will be clearly stated, and perhaps frequently repeated, in the progress of our course, and it is not deemed necessary to detain you with lengthy preliminary remarks, nor with an abstract discussion of general principles. Not that the general principles of medicine are undervalued, or are by any means to be lost sight of in these lectures, but it is believed they can be more clearly elucidated, and more forcibly presented, as they shall be found involved in the consideration of the various forms of disease. The short time necessarily allotted me for the presentation of the subject in hand, in its various aspects, requires that our time should be husbanded with economy, and that such subjects only as are indispensable to our final object, should be introduced, or at least discussed at any length.

The object at which I shall aim, during my occupancy of this chair, will be to present to the class *all* the important and indispensable information in my possession, in relation to the true nature and proper treatment of disease, and especially such facts as have come under my personal observation, and such principles as have been developed or confirmed by my own experience. I say that it will be my object to be full and explicit on these most important subjects, many of which you can learn from the living teacher only; but I shall crowd into the course also as much general information, and as many minor topics, as can be done consistently with my leading object. I shall, in the main, speak from experience, and when I derive my information entirely from others, in speaking of subjects in which I have had no experience, I shall give them due credit for, while I pass over to them the responsibility of, the instructions thus given.

PRINCIPLES OF MEDICINE.

LECTURE I.

GENERAL PATHOLOGY.

Preliminary Observations: Medicine as a Science—as an Art; Relation of Practical Medicine and Pathology to each other—to other Departments. Disease Defined. Methods of Pathological Investigation: Synthetical Method; Analytical Method; Autopsy.

PRELIMINARY OBSERVATIONS.

Before entering upon the consideration of Special diseases and their treatment, it is proper that we bestow some attention upon the general principles which form the basis of a Rational Theory and Practice of Medicine. We may in this way, perhaps, do much to narrow the field of our researches, and consequently render more easy the task which lies before us, which will be found sufficiently extensive after we shall have availed ourselves of every expedient to bring the subject within the narrowest limits.

Medicine is both a science and an art. As a science, it embraces a knowledge, as far as attainable, of all the phenomena which characterize the conditions and actions of living bodies, both in health and disease, and the rationale of those changes which are wrought in them by the influence of deranging and remedial agencies. In all these respects, however, Medical Science is still in its infancy, for although we have now attained a very complete knowledge of the anatomy of the human body, by repeated and minute dissections, and by means of the microscope have been able to study what appears to be the ultimate structure of organic bodies, and to observe many processes of vital action, as carried on in living organs in health and disease, yet the most successful researches have demonstrated the fact, that much still remains undiscovered and

GENERAL PATHOLOGY.

undiscoverable with the means of observation as yet within our reach. And although chemistry has thrown a flood of light upon the subjects of physiology, pathology and therapeutics, there are recesses in nature's laboratory to which that light has not yet extended, and we are consequently left, in regard to many facts with which it is highly desirable to possess demonstrative knowledge, to mere conjecture, or at best to such deductions as appear to be rationally drawn from what has been clearly ascertained.

The rapid progress which has recently been made in the natural sciences, is highly encouraging to the medical philosopher, for almost every discovery tends, in one way or another, to remove obstacles from his path, to furnish him with new items of knowledge, or to give him new instrumentalities with which to prosecute his own researches; and when we reflect that each field of research must have its natural limit, and that each well established truth diminishes the number of those to be discovered, we are certainly warranted in cherishing the hope that a day is coming, in which hypothesis will be replaced by positive knowledge, and medicine approximate in a good degree the character of the certain sciences.

As an art, medicine teaches the best methods of accomplishing what must, of course, be regarded as the chief end of all medication, the relief of human suffering and the prevention and cure of disease. Many of the methods employed in the healing art are strictly scientific, being those which ascertained facts indicate as the means adapted to the desired end; but by far the greatest portion of our resources are merely empirical; that is, they are employed because by accident or by former experiments they have been found or fancied to be useful. Indeed, it is the true test of value in regard to any agent, to show, not by reasoning, *a priori*, that it ought to cure, but to establish by actual experiment that it has proved efficient. Science may acquaint us with the pathological condition of our patient, and teach us what changes must be wrought to effect a cure, but, in the main, repeated experiment alone enables us to select and successfully apply the proper remedy. When the indications of science have been verified by the test of experiment, the results are gratifying in a high degree, but not more so than when, as is the case in many instances, science finally demonstrates that agencies which have been long successfully though empirically employed, were the very ones best adapted to accomplish the desired end.

The *art* of medicine is without doubt older than the *science*, for

before man knew any thing of the philosophy of disease, he suffered from its effects, and sought relief in such means as were within his reach, trying one thing after another until something was found which appeared to accomplish the desired cure. Perhaps in a state of nature, in which the guidance of instinct would of course be more reliable than it can be in civilized life, he may have possessed, in some degree, that intuitive perception, which enables the lower animals to select proper from improper articles of food, and, as asserted by some naturalists, to chose efficient remedies for the cure of wounds or maladies. But whether from instinct, by accident, or after successive experiments, there can be no doubt that curative agents and measures were originally selected without any previous knowledge of the morbid conditions indicated by the symptoms of disease; and it is very certain that many hypotheses both of ancient and modern times, which subsequent researches have demonstrated to be correct, were adopted for the explanation of the results of empirical practice. Thus medicine as an art has done much to suggest, elucidate and demonstrate the principles of medical science.

The *art* of medical practice is chiefly to be attained by studying the *materia medica*; whereas, the *science* of medicine is more readily approached from the side of pathology. Therapeutics form a connection between the two extremes, taking the remedies furnished by the former and explaining their actions in accordance with the principles, so far as ascertained, of the latter. It is impossible, therefore, to comprehend medicine as taught at the present day, by studying it in one of its aspects without making ourselves acquainted with the others also. As, however, the subject of *materia medica* is thoroughly taught by one of my colleagues, I shall confine myself to the duty of giving an outline of the principles of pathology, meeting my colleague on the common ground of therapeutics, where I trust you will find the teachings of both chairs to harmonize, and mutually elucidate and confirm each other.

There are three other chairs to which I must also refer you for many of the facts upon which rest the principles of pathology and of scientific practice, namely: Anatomy, Physiology and Chemistry. If you shall thoroughly attend to the teachings of my colleagues in these departments, you will, it is believed, have little difficulty in comprehending the theory of rational medicine; otherwise, much of what you will hear from this chair will perplex and confuse your minds, without adding greatly to your stock of knowl-

edge; for it will be impracticable for me, within the time allotted to a course of lectures, to give instruction in any of the subjects that have, in the division of collegiate duties, been assigned to my colleagues. Indeed, were it not that the subjects of Surgery, Obstetrics and the Diseases of Women and Children, which are co-ordinate branches of Theory and Practice, have been erected into distinct departments and committed to able professors, I should have little hope that you would receive, in a course of lectures occupying one hour each day during four months, even an outline of that knowledge which it will be important for you to possess when you enter upon the practical duties of the profession you have chosen. But as I have no reason to doubt that you will attend industriously to the teachings of all my colleagues, and will obtain from them the collateral information necessary to prepare you to comprehend what it is in my province to present, I shall now cheerfully assume the labors of my course, and endeavor to conduct you, step by step, through the Principles of General and Special Pathology and Medical Practice.

DISEASE DEFINED.

It is the province of *physiology* to give the history and explain the phenomena which distinguish the living from the dead body; while the object of *Pathology* is to describe and explain the peculiarities of action or condition by which diseased states of the living body differ from the healthy. Pathology may therefore be regarded as included within, and as forming a branch of Physiology. In a state of *health* the vital actions are all performed with ease, regularity and efficiency; whereas, *disease* is defined, in general terms, to be "any such alteration of the vital actions going on within the body as causes suffering or danger." (*Allison*.)

Disease in this sense, it will be observed, is applied merely to the actions which are taking place in the system, and of course can have reference to function only. Pathologists are accustomed, however, to give the word a wider signification. So that not only morbid modifications of the vital actions, but any alteration of structure, accompanying or caused thereby, is also spoken of as disease. Hence disease is said to be either functional or structural, and to embody both these conditions, it is defined to be "any derangement of the organization, or of one or more of the functions of the body." (*Wood*.)

A rigid adherence to either of the above definitions would require

us to regard as disease many changes which occur in our bodies, which from the trifling effects they produce or from the brevity of their duration attract little or no attention. The boundary between health and disease is somewhat broad, sufficiently so, at least, to allow considerable changes in the character of the vital actions to take place within the limits of health; and many changes occur of sufficient degree to constitute disease, but so transient in duration as to be regarded as mere fugitive irregularities requiring little or no attention. Our objection, however, is not to construct a rigid definition of disease to which there can be no exception, but to present one that will clearly express the meaning of the word, as applied in medical practice. As physicians, our attention is seldom called to changes in the vital actions, which have not so far transcended the limits of health, as to leave little room for doubt as to their character in this respect.

As vital action in each organ, and, indeed, in each tissue of the body, has certain peculiarities in which it differs from the vital action of every other organ or tissue, so every organ and tissue presents peculiarities, more or less marked, when derangement of function or structure occurs, and if the subject of general pathology could only be pursued by observing and explaining morbid conditions in the parts affected, its consideration, as preliminary to the study of special diseases would be extremely irksome, and a mere loss of time. Fortunately, however, we are able to subject the almost endless varieties of morbid conditions to a sort of analytical classification, based upon what may be regarded as the elements of diseases, and thus very much simplify the subject.

METHODS OF PATHOLOGICAL INVESTIGATION.

This I shall attempt to do in my next lecture, and will occupy the remaining portion of the present hour with an outline of the chief method employed in arriving at pathological knowledge.

The first inquiry that naturally arises, when we observe the symptoms presented by a case to which we are called, is, what do these symptoms signify? In other words what changes within the system are manifested by these external signs? It is not enough to say the patient is ill, nor yet to name his disease, as fever, inflammation or cholera, as the case may be. Such an answer may do to satisfy the patient or his friends, but the physician can not but desire to know more than this. What is fever? what is inflammation? what condition of the blood or the organism is expressed by the symptoms

denominated cholera? are questions that must force themselves upon his mind and awaken a desire for such knowledge as shall qualify him to render an intelligent answer. This will lead him at once to the study of general pathology, which explains the nature of those internal actions and conditions which express themselves in the external symptoms that are recognized as characteristic of special diseases.

But it is impossible to penetrate at once to the seat of the difficulty, and observe the internal process of disease. "Positively no admittance" is inscribed on the entrance to the laboratory in which nature conducts her vital operations, whether those operations are performed in the regular and successful manner which characterizes the normal state, or under the disturbing influences which so modify them as to constitute disease. We can approach the building, observe what enters and what leaves it, notice external appearances and changes as the internal operations are varied, listen to the sounds produced by the machinery within, and even occasionally peep through a window or crevice with the hope of discovering the mystery, but with slight success. When the vital actions have ceased we may explore every apartment, inspect all the fixtures and apparatus which have been employed, note how they appear to have been used and the condition in which they are left, and wherein they differ in the present case from those we have examined under other circumstances; but all we can accomplish in this way is to obtain data upon which to base plausible conjectures in regard to many of the processes which were in progress during life. In brief, if we would comprehend the nature of diseased action, we must subject ourselves to the tedious duty of studying the influence of causes acting upon the living organs, the symptoms which attend abnormal modifications of vital actions, and the changes that are wrought by morbid processes in the various textures of which the organs of the body are formed, as far as practicable during life, and by autopsy after death; and then, from the information thus attained, draw such conclusions as will harmonize all the ascertained facts with each other and with the known laws of nature.

There are two principal methods of investigation, each of which enables us to gain important information in regard to the nature of disease, and both of which are required to be employed in our efforts to thoroughly canvass this important subject.

1. *Synthetical Method.*—The first method to which I refer, and the one which I regard as by far the most conclusive and satisfac-

tory, so far as it is practicable, I shall call the synthetical method, because in pursuing it we commence with known causes, and observe their effects when operating upon the living tissues and organs, in modifying and deranging the vital actions, and producing those states which we denominate morbid. We find the body in a physiological condition or state of health, and then consider the action of such causes and influences as must tend to produce more or less disturbance, and follow up the successive changes that necessarily occur, until we observe the unmistakeable evidences of a pathological condition or state of disease. If you prefer to have the point to be attained by this method, stated in the form of a problem, it may be briefly expressed thus :

The nominal constitution and physiological actions of the human body being known, and the presence of ascertained disturbing causes being stated,—to determine in what manner, to what extent, and with what result, the functions, fluids and structures of the body will be changed from the condition of health.

In pursuing this mode of inquiry we find some very interesting facts to be readily determined by what we know of the laws of nature. For instance we know that water introduced into the blood must diminish its specific gravity, that a rupture of blood-vessels must allow the contained fluid to escape. That the force of gravity disposes the fluids to accumulate in the lowest parts of the body, as in the feet when the person is erect, and in the head when it is placed in a dependent position ; and of course any thing which arrests or debilitates the circulatory actions by which in health the the law of gravity is overcome, must be followed by subsidence of the fluids.

There would be little difficulty, even in the absence of clinical observations, in determining that the direct effects of ligatures around the limbs or applied to isolated blood-vessels, of tumors pressing upon them, diminution or obliteration of their calibers by constriction of their walls, or the deposit of obstructions within them, must be to produce congestion of the capillaries and organs which are in health drained by the obstructed vessels, and deficiency in parts, the supplies of which are thus cut off.

It is now quite evident that the functions of the nervous system depend upon the movements of an agent analogous to electricity, in regard to the laws by which it is governed ; and that this agent during healthy action is continually playing upon the nerves as conductors, thus sustaining constant communication between the

nervous centers and the organs of the body. Now if we are able to predict the result of breaking the wire of a magnetic telegraph, we may also appreciate, to a limited extent, the effect of pressure upon, or other interference with a nerve by which its function as a conductor is impaired or destroyed. Our knowledge of chemistry, too, affords us great assistance in this method of prosecuting pathological researches. We know for instance that acids and alkalies when brought in contact must neutralize each other within the body, as they do out of it. We know that excessive heat or cold and the action of powerful *caustics* produce decomposition of organized structures, and we can be at very little loss in appreciating to some extent the direct effects of their application to the living tissues of the body.

It is well therefore for you to study every part of the system with reference to its relation to physical and chemical laws. To accustom yourselves to contemplate the result of such laws as they operate upon and within the body. Not that these laws are alone to be regarded as affecting the system, but because their influence is so great, that, without taking them into the account, you will very frequently, if not generally, fail in your efforts to comprehend the phenomena of disease.

We may trace the relation between cause and effect in some cases where the *vital processes* of the system are more especially concerned. We know that in a state of health every action within the body tends to wear out some portion of the organism concerned in that action; that the part so worn out becomes effete matter, foreign to the living tissues, and that provision is made for its removal from the body. We know, too, that the waste of the tissues thus constantly occurring, is required to be replaced by new materials obtained from the blood, and that this makes it necessary to introduce into the system an adequate amount of raw material, which, through the process of digestion, may be fitted to replenish the blood and thus compensate for the loss. Now with these facts established, there would be no difficulty in determining, *a priori*, that withholding food or supplying articles that can not be digested, or which, when digested, do not contain all the elements necessary to the constitution of healthy blood, must impoverish that fluid, and produce emaciation of the organs. It is also evident that excessive functional activity, must have the same effect, if carried to such an extent that the waste of the body exceeds the supply that can be furnished through the digestive organs.

But there are relations between disturbing causes and the changes they produce in the system which are by no means so obvious. Repeated experiments demonstrate the existence of such relations, which could not have been discovered by any other means at present within our knowledge. Who could have perceived any such relations between lobelia or jalap and the human system, as to foresee that one of these agents must act as an emetic and the other as a cathartic under ordinary circumstances. The narcotic poisons produce mischief when taken into the system in certain quantities, but we know the fact merely from past observation of their effects.

But these facts derived from empirical medicine, are no less a portion of the data upon which the solution of our problem depends, than are the mechanical, chemical, and physiological facts and laws, to which I have adverted. We may not be able to determine how they act, but we can anticipate from what has been seen of their effects, what influence they will exert, if introduced into the system, and we may, perhaps, successfully inquire by what means or avenues they enter it or are brought to bear upon it, and ascertain the character and importance of the changes of function or of structure they tend to produce.

But in many cases the primary disturbing cause is unknown, and we are consequently left to conjecture, or must resort to hypothesis if we would supply the deficiency. This may sometimes be done with great advantage, for in this way, we can occasionally explain phenomena which would otherwise greatly perplex our minds and embarrass our diagnosis; but such expedients belong rather to the analytical than to the synthetical method. But where the primary cause is unknown, we may commence our examination at some point where the effects of antecedent causes are observable, and regard such effects as causes of changes yet to follow. The blood, for instance, may have been seriously modified in regard to the quality or quantity of one or more of its elements, in the absence of any obvious cause, and we may or may not be able to set up a satisfactory hypothetical explanation of the derangement. We may, at all events, commence here and inquire, what must be the consequence, in a pathological point of view, of the state of things now existing? Thus our researches in this department of science may proceed step by step, commencing wherever we can discover any thing which may be a cause of derangement, and in the light of science estimating its influence. Thus, too, each effect, produced by a known or unknown agency,

may itself become the cause of further changes, and thus we may be guided forward in a chain of antecedents and sequences, through all the phenomena that characterize a state of disease.

2. *Analytical Method.*—The other method of research to which I referred, you may term analytical, if you please, for it is convenient to have a single word by which to designate it and I do not now think of a better one. The problem now to be solved may be stated thus:

Given the symptoms developed during the progress of disease, to determine to what extent, in what respect, and from what causes, the functions, fluids and structure of the body differ from their condition in health.

The study of disease by this method consists, as you perceive, in tracing the relations of cause and effect in an inverse manner. You commence at a certain period in the progress of a case, observe all the symptoms then present, and learn as much as you can of its previous history, and from the totality of phenomena thus presented, determine the nature of the internal changes that have occurred, and of which the symptoms are an external expression.

In making your observations with the view of ascertaining the pathological condition of the internal organs, you can not be too thorough. Every circumstance that may serve to throw light upon the subject should be carefully noted. The skin, the visible portions of the mucous membranes; and the physical condition, sensibility, and functional action of the organs should be examined. The blood and secretions should be scrutinized, and the influence of therapeutic agents observed. In short every possible view of the case should be obtained, that may aid in forming a rational conception of what would be discovered within the body, by an eye capable of scanning every organ, tissue, and fluid. You will now be prepared to consider the meaning of the phenomena you have discovered, and will be able, in many instances, to arrive at very clear and satisfactory conclusions.

For instance you may be able to determine with certainty in what organ of the body the disease is chiefly located. This may be done in one of two ways. *First.* The symptoms may clearly locate the morbid condition in some organ, because that organ is the seat of pain or tenderness, or is modified in regard to size, or functional action. *Secondly.* When the symptoms are more obscure, you may need to be more careful in analyzing them and interrogating the organs. You may now adopt what is called

sometimes the process of diagnosis by *exclusion*. That is, you may ascertain what organs give positive evidence of health, by the condition in which you find them, and thus narrow the field of research to those organs about which doubt still exists. Then by further attention to the symptoms already noted, and others which may present themselves, you will generally be able to fix positively the *locality* of the morbid affection if nothing more.

Having accomplished this much you are prepared to progress still further. The question now to be answered is, what is the nature of the disease you have found to be present? Is the affected organ in a state of excitement or depression as regards its vital actions, or are those vital actions perverted in such a manner as to produce a vitiation of function or an alteration of structure? The character of the symptoms if carefully studied will often enable you to arrive at correct conclusions in this respect. A state of excitement usually expresses itself by symptoms very different from those which indicate depression of vital actions, and perverted action is generally marked by phenomena sufficiently distinct to distinguish it from both the others, although it may partake of the qualities of either.

Autopsy. Under this head, too, may be mentioned examinations of the organism after death. If you have had the opportunity of observing a case during its progress to a fatal termination, the post-mortem appearances may throw much light upon what was previously obscure, and may either confirm or correct the diagnosis you had formed, in regard to the state of internal organs. This of course can not benefit the deceased, but may afford information of much importance to the living. Pathological anatomy must in the main be studied in this way, and it is to the recorded observations of those who have enjoyed and improved advantages of this sort, that we are indebted for much of what we know on this important subject.

You need not, however, expect always to find well defined foot-prints of disease in the anatomical tissues. One who has spent much time in the dissecting room where most if not all of the subjects are furnished from unknown sources, will remember how often the demonstrator is unable to discover in any of the organs unequivocal evidence of disease, and especially to detect changes sufficient to account for the fatal result. But where an organ is known to have been affected, as by inflammation for instance, it is a subject of much interest to observe the modifications which have been effected

GENERAL PATHOLOGY.

by the disease, and as far as possible connect all such changes with the symptoms by which they were indicated during life.

Autopsical proceedings should be conducted with great care and patience, and if practicable sufficient time should be taken to note down the condition of every organ. A mere cursory inspection, or a hasty cutting and slashing of the organs, in the manner I have often seen such examinations performed, is of very little value as a means of learning pathology. It is only by carefully noting the condition of each organ in regard to size, density, integrity, color, adhesions, and other peculiarities indicating deviations from the normal state, that the time and labor spent in this way, can be turned to much account.

Thus you are to study pathology by the employment of every method which may afford you information. Fortunately we now enjoy great advantages, derived from the industry and patient research of those who have preceded us, and who have left the results of their labors upon record. It is to be regretted, however, that the researches of medical men have not always been conducted under an unbiased desire to ascertain the truth, but in too many instances they have been prosecuted with the view of sustaining some favorite preconceived hypothesis; and in the book of nature as in the sacred writings, the prejudiced mind will seldom fail to find abundant testimony which is susceptible of being interpreted to suit his views whether right or wrong. It appears to be the design of the God of nature and of grace that he alone who seeks with sincere heart for truth shall find it, while he who searches with improper purposes, shall be permitted to confirm himself in error and "believe a lie that he may be damned." Let us be careful that we belong not to this class.

LECTURE II.

GENERAL PATHOLOGY—CONTINUED.

On Disease of the Fluids: Causes and consequences of morbid states of the Blood; 1. Presence of deleterious foreign substances, 2. Want of due proportion as to quantity among the normal elements, 3. Abnormal character of the constituents of the Blood.

ON DISEASE OF THE FLUIDS.

I now proceed to give you an outline of the principles of general pathology, in which I desire to embody the most important portions of the knowledge we possess on this subject.

It is usual to consider disease under two heads, viz: Disease of the fluids and disease of the solids. This division is not strictly philosophical, for it is scarcely possible for either the fluid or solid portions of the body to be morbidly affected without the other being more or less deranged. Still it may not be improper to retain the distinction, since it affords a convenient mode of classification, and because, though both may be diseased at the same time, and it may be difficult or impossible to say in which the morbid state originated, yet it is important to appreciate as far as possible, what peculiar condition of the one or the other constitutes disease.

The fluids may be arranged into three classes: *First*, Those which supply material for the formation of blood, the chyle and lymph; *Second*, The blood itself, arterial and venous; and *Third*, The fluids which are derived from the blood, called secretions. In a pathological point of view, however, it will only be necessary to inquire into the elements of disease as existing in the blood itself, since any derangement which may exist in the first class of fluids must soon manifest itself in the blood, and diseased conditions of the secretions if not caused by a morbid state of the blood, must depend either upon some derangement of the secreting organs, or of the organs in which they are detained after secretion, and in either case the real difficulty would fall under the head of diseases of the solids.

CAUSES AND CONSEQUENCES OF MORBID STATES OF THE BLOOD.

All morbid states of the blood may be referred to one of the three following conditions. 1. The presence in the blood of deleterious *foreign substances*. 2. Want of due proportion as to *quantity*, among the normal constituents of the blood. 3. Abnormal changes in the *character* of some of the constituents of the blood.

1. *The presence in the blood of deleterious foreign substances.*—There are several ways in which foreign substances find their way into the blood. Matters extraneous to the body, may be absorbed through the skin, lungs, stomach, and intestines. Feces, and secretions destined to be removed from the body, may be so long retained that re-absorption takes place. Thus some of the constituents of bile, urine and other excrementitious substances often re-enter the circulation, after having been removed from it. Morbid matters within the system, as the products of disease or mortification in the solids, may be received into the blood-vessels by interstitial absorption. *Pus* can not, it is true enter the blood-vessels by the ordinary process of absorption, because the *pus-globules* are even larger than the white blood-corpuscles. The fact, however, is beyond dispute that this substance is often found in the blood of patients afflicted with local suppurative affections, and its entrance into the vessels may perhaps be explained in one of two ways: either some of the vessels have openings made in their walls by the ulcerative process, through which the *pus-globules* are admitted; or fluid sanious matter from the seat of disease, capable of generating *pus-globules*, is absorbed and the globules are afterward developed perhaps from the febrin of the blood. Disease of the lining membrane of the blood-vessels or lymphatics is sometimes the source of *pus*, when no abscess or other purulent collection is known to exist. In any or all of these ways the blood may become contaminated by the introduction of deleterious substances.

Another cause of contamination of the blood by deleterious substances is deficient elimination. In the performance of the vital actions of the body, portions of its materials are being constantly reduced to the condition of inorganic substances, which being no longer capable of subserving any of the purposes of the animal economy, are destined to be removed by the excretory organs. So long as a due-equilibrium exists in the actions of the system, these effete matters are eliminated as fast as they enter the circulation. But when these excrementitious matters are produced in excessive

degrees without a proportionate increase in the excretory activity, or when without any increase in the production of effete substances, there occurs a suspension or diminution of the excretory processes, the excrementitious materials may accumulate in the blood and produce as much mischief as would a like quantity of the same substances, if introduced into the system by absorption. Thus, suspension or embarrassment of the functions of the skin, lungs, intestines, liver or kidneys, is often followed by a vitiated state of the blood, from the accumulation in that fluid of urea, uric acid, biliary coloring matter, sugar, carbonic acid, and other pernicious principles, which although necessarily produced in the body in a state of health, should be constantly eliminated by the emunctories just mentioned, as fast as they are formed.

The consequences resulting from contamination of the blood by deleterious foreign substances depend of course upon the character and quantity of such substances, and upon the constitutional vigor of the patient.

Poisonous substances are often present in the circulation, without producing appreciable derangement, when the quantity absorbed is small, when there is sufficient vital power to resist their impression, or when they are promptly removed by the eliminating organs. Where a morbid impression is made on the system in this way, its nature of course, depends, in a great measure, upon the character of the agent that produced it. Some poisons, as miasmatic and contagious effluvia, are capable of remaining for an indefinite time in the system, probably in the blood, before their presence is manifested by any morbid symptoms; others produce their specific effects instantly or in a very short time after their introduction. Dr. Geo. Harley injected half a grain of acetate of strychnia into the thoracic cavity of a dog; in thirty-six seconds he became tetanic. Another dog became tetanic in four seconds after Dr. H. injected one-twelfth of a grain of the same poison into the jugular vein (*Braithwaite's Retrospect* part 34, page 302).

Some poisons appear to exert but little or no influence on the blood itself by their presence in it, but make their morbid impression upon certain organs to which they are conveyed by the blood in which they are held in solution; others directly modify the vitality of the blood-cells, either by paralyzing them or by interfering with the absorption of oxygen and the elimination of carbonic acid; and when such an impression is long sustained, there can be little doubt that death of the red corpuscles may be the

result. Other agents when in the blood act chemically on its constituents, causing solution of the cell-walls, and variously modifying the fluid, either by entering into chemical combination with some of its essential elements, or catalytically favoring such changes among those elements themselves, as produce serious deterioration in the qualities of the blood, and render it unfit for circulation in the capillaries, or to furnish the supplies required for nutrition and secretion. Such changes in the blood are a fruitful source of disease.

2. *Want of due proportion, as to quantity, among the normal elements of the blood.*—The equilibrium of the constituents of the blood may be deranged by either excess or deficiency in the quantity of one or more of those constituents. You will please bear in mind the normal constitution of the blood.

While in circulation the blood presents two constituents, the one solid or organized, the other a plastic fluid. The organized portion consists of the red blood-discs and white corpuscles, the former of which greatly preponderate, constituting in their moist state about one half of the entire blood, though when dried they are reduced to about 12.7 per cent. of healthy blood. These bodies float freely in the serum and the red cells are subject to constant changes in their condition, as they pass from the arterial to the venous side of the circulation, and *vice versa*, in the fulfillment of their function of conveying oxygen from the lungs to the tissues, and carbonic acid from the tissues to the lungs. Their mode and place of development has not yet been fully settled by physiologists, though it is nearly certain that they originate in some way from the white corpuscles, probably from the nuclei of the latter. (*Wharton Jones*). They are said to exist in larger proportion in the blood of the hepatic veins than any where else in the system, and the opinion has been expressed, that one of the functions of the liver is the development of red from colorless blood-cells. Be that as it may, it is not our present object to discuss questions of physiology, but to inquire into the peculiarities of morbid conditions. I may however be permitted to remark, that the organized blood-discs are evidently subject to the general laws of animal tissues; in other words, that the exercise of their functions wears them down to decay, and their place is constantly supplied by the development of fresh cells.

The two processes of development and destruction of blood corpuscles being thus constantly carried on in the system, it is not difficult to understand how their relative proportion to the other

constituents may be made to vary. If they are developed from the white corpuscles, the latter are formed in part at least at the expense of the albumen and fibrin, and this process of development may be continued after the supply of albuminous materials has been diminished or withheld, and in this way the liquor sanguinis be reduced in specific gravity. In that case the blood, if drawn from the body, will speedily form a large but soft clot, with perhaps a stratum of fibrin on its surface, called "the buffy coat," because the rarity of the serum permits the globules to subside before the fibrin which may be present has time to coagulate.

The red globules, in common with the fibrin, may continue to be vigorously developed under generous diet, for a time after the individual has ceased from habits of exercise which previously kept the functions of respiration and nutrition in active progress, and these elements may in this way be much increased beyond their normal ratio to the water of the blood, and the specific gravity and stimulating properties as well as the absolute quantity of that fluid be increased. A state of plethora may thus be produced, in which the vessels are distended with rich, red, stimulating blood, which if drawn from the vessels, will slowly form a large, firm clot, but without the buffy coat. Such a state of the blood can not however, be properly denominated disease, since it is in reality produced and maintained by the natural process of development. Disease, if present at all, must be referred to the failure of activities on the side of secretion, nutrition and respiration, or to an inability of the system to sustain the pressure and influence of so great an amount of healthy blood. Such a state of the circulation may be endured by some constitutions an indefinite length of time without sustaining any injury or inconvenience, whereas others would be subjected to attacks of congestion or hemorrhage. It does not, however, seem to constitute a predisposition to inflammation. (*Carpenter*). Thus, what is really a healthy condition of the blood in certain states of the constitution may be fraught with danger under other circumstances.

Meager or unwholesome diet, excessive muscular or mental effort, immoderate secretion, bad air or active depletion by any means, but especially by loss of blood, tends to reduce the red globules and induce a state of anemia. In some cases of this kind the clot formed by the blood is exceedingly small, while it may be either firm, if fibrinous, or soft and diffuent if deficient in fibrin. Although an excess of the globules can scarcely in itself constitute disease, as

before remarked, the same can not be safely said of a considerable deficiency; though the system, when in good condition in other respects, seems to tolerate great variations in both directions from the average quantity. Professor Carpenter informs us, and others confirm the statement, that the red blood cells may vary from 110.5 to 186, parts in 1000, in the male, without the health being seriously affected. The range of variations in the female is even greater than this.

I can not here forbear the suggestion that mere excess or deficiency of the blood cells, does not appear to me, to demand blood-letting in the one case or transfusion in the other; but the exhibition of measures addressed to those conditions of the system which cause the want of equilibrium in the blood, and to those which render it unable to sustain and correct the evil.

Blood-letting is as truly a surgical procedure as amputation of a limb or extirpation of a gland, and as physicians we are called upon to obviate disease, if possible, without destroying any portion of the system. If it can be shown that cases occur in which a surgical operation alone can save the patient, let that operation be performed, but since the blood is a vital fluid peculiarly amenable to the modifying influences of medical agents, and especially to such as reduce its stimulating properties and regulate its circulation, it should certainly not be abstracted from the body upon slight pretexts. If it can be shown to be positively diseased to an extent that threatens putrefaction, let it be removed if you think fit, just as you would amputate a gangrenous limb, but I suppose the most zealous advocate of phlebotomy, would never think of his lancet for a case of this kind. The blood must be rich in globules, and possessed of the stimulating influence of functional vitality, to justify blood-letting among the most intelligent of the advocates of the measure. And why? Because the solids are too much diseased to bear the presence of so much healthy blood. Then I would say, let us improve the health of the solids, and not reduce the blood to a corresponding state of disease, by robbing it of its organized elements which must be immediately replaced by the absorption of water with perhaps the morbid detritus from the unhealthy tissues.

The white corpuscles form so small an element, and are so transient in duration, that they require little attention in discussing the pathology of the blood. They are said, however, to exist occasionally in considerable excess as compared with the red corpuscles in anemic conditions, connected with disease of the spleen, liver

and lymphatic glands; and constituting the disease to which the term leucocythemia (white-cell-blood) has been applied. It is probably owing to an arrest in the progressive development of red from white cells.

But not only are these organized portions of the circulating fluid liable to variations in regard to quantity; the constituents of the liquor sanguinis are also liable to excess or deficiency as compared with the ordinary condition of this part of the blood, and that too, without any appreciable change in the quantity of the corpuscular elements. The entire liquid portion may be increased or diminished together, thus varying the quantity and specific gravity of the blood and causing the more observable portion, the corpuscles, to appear to be abundant or deficient, as the case may be, when they have in fact, neither increased nor diminished in absolute quantity.

But the elements of the liquor sanguinis also vary in quantity in relation to each other. This portion of the blood, you remember, is chiefly composed of water and certain plastic and saline elements held by the water in solution. Its average composition may be concisely stated thus: (*See Bowman's Med. Chem.*)

Proximate Elements of Liquor Sanguinis.	Their average Proportions to the Entire Blood.
Fibrin,.....	3 parts in 1,000.
Albumen,	70 parts in 1,000.
Salts,	10 parts in 1,000.
Water,.....	790 parts in 1,000.
Add Globules,.....	127 parts in 1,000.
	<hr/> 1,000

The fibrin may vary from 2 to 4 parts in 1,000, without any marked influence on the health. You observe that it is small in quantity as compared with the other elements. It is constantly drawn upon by the function of nutrition and by some of the secretions, and a portion of it is probably consolidated in the development of the blood-cells. It is probably produced by the modification of albumen, perhaps under the influence of oxygen, though the precise mode of its production is not clearly determined.

In fact the difference between albumen and fibrin in chemical composition is very small as shown by the following comparison of the three protein compounds, which I find in Bowman's Medical Chemistry.

	Albumen.	Fibrin.	Casein.
Carbon,	55.46	54.45	54.66
Hydrogen,	7.20	7.07	7.15
Nitrogen,	16.48	17.21	15.72
Oxygen,	18.27	19.35	21.55
Sulphur,	2.16	1.59	.92
Phosphorus,	.48	.88	—
	<hr/> 100.00	<hr/> 100.00	<hr/> 100.00

From what has been said you perceive that Fibrin must tend to accumulate in the blood when the nutritive function is arrested or even diminished, if digestion and absorption are not at the same time proportionately lessened. It is not indeed at all improbable, that the conversion of albumen into fibrin is greatly accelerated by certain excited states of the system which tend to retard the nutritive and secretory functions. This appears to be the case in inflammation, and accounts for the fact that fibrin rapidly increases during the progress of inflammatory disease. The fibrin can not be regarded as a cause of inflammation, for the disease often commences while the fibrin is at or below the normal standard,—as in typhoid fever,—in which case the fibrin at once begins to increase, and continues to do so, as long as the inflammatory action continues. Its increase must therefore be regarded as an effect rather than a cause of inflammation.

I am not, however, prepared to adopt the hypothesis of some recent writers, that fibrin is an excrementitious substance, destined to be eliminated from the blood. The facts and arguments adduced, are by no means conclusive, and are not therefore sufficient to warrant us in believing that an element, always found in the blood during health, and one upon which its fitness for circulation, to a great extent, and its coagulability entirely depends, bears a relation to the vital fluid similar to that of carbonic or uric acid. It is almost certain that some of the organic structures of the body, especially those of low organization, would cease to be developed, were it not for the presence of coagulable fibrin. An increase of fibrin is generally attended by a diminution of albumen.

When fibrin is in excess, as compared with the red corpuscles, it produces a firm coagulum in blood drawn from the vessels, and when the condition of the blood is such that the corpuscles settle to the bottom before coagulation commences, the fibrin forms a light-colored stratum on the surface of the crassamentum, usually

termed the "buffy coat," and when the fibrin is highly elaborated, the contraction of its fibrillated net-work draws in the edges of the upper surface of the clot, and produces what is called the "cupped" condition. But neither of these appearances is necessarily to be taken as diagnostic of inflammation, for it is now acknowledged by all pathologists, that the buffy coat may be wanting when there is a large amount of red corpuscles in blood extracted during acute inflammation, and that it is generally present in the blood of chlorotic patients, from the deficiency of corpuscles, and the rapidity with which they sink, the serum not being of sufficient specific gravity to suspend them long enough for the fibrin that is present to coagulate. Bleeding does not diminish, but increases the fibrin, by arresting nutrition, and stimulating the processes of absorption and development, by which the system attempts to replace the lost blood.

Insufficient food, and excessive fatigue, both tend to reduce the fibrin, the former by deficiency of material from which it may be produced, the latter by consumption of fibrin beyond the power of the system to develop it. Other influences, which interfere with the vital processes, as experienced in low forms of fever, have the same effect. It may sometimes appear to be in excess, when the contrary is the fact, owing to great deficiency of other ingredients, and especially of the corpuscles. Its deficiency seems to predispose to low or asthenic forms of disease, and to prevent recuperation of the strength, and repair of the tissues, though here too it is probable that the effect is generally taken as a cause; since it is probable that the defect in the reparative powers of the system is manifest in an inability to elaborate fibrin, as well as in the higher processes of tissue development, and the exercise of the organic functions.

Albumen is subject to less variation in absolute quantity than fibrin, during ordinary health, but in disease, it is subject to various influences, tending to modify its amount. When in excess, it increases the specific gravity and viscosity of the blood, and seems to favor the development of inflammation, as it has often been found in excess at the commencement of inflammatory disease. If, however, food be withheld, or digestion be arrested, it is soon diminished by the development of fibrin, which is formed at its expense.

Deficiency of Albumen may result from impoverished diet, excessive depletion, as by blood-letting or hemorrhage, or from

albumenuria or Bright's disease of the kidneys. It tends to dropy, owing to the watery condition of the blood.

The water of the blood may be greatly excessive or deficient. Various circumstances favor dilution of the circulating fluid. Deficient supplies, or rapid waste of the solid ingredients, is generally followed by the absorption of water to fill the vessels. On the other hand, its rapid withdrawal, by perspiration, diuresis, or hydragogue catharsis, tends to cause deficiency of water in the blood. This condition renders the circulation, in the capillaries, difficult, and interferes with the functions generally. It favors congestion, and inflammation as a consequence; and if it exist in a great degree, sometimes produces such a stasis of the circulation in the nervous centers, and throughout the system, that the powers of life are prostrated, as is seen in the collapse of malignant cholera.

The saline elements of blood may vary considerably during health. As they are held in solution by the water, they are apt to be carried with it in the processes of endosmose and exosmose; more so than the plastic or viscid substances. They are more likely to be deficient than excessive, for it is more easy for them to be drained off by excessive secretion, than to be introduced by the ordinary process of absorption, which appears to be the principal mode by which they are introduced into the vessels. When in excess, they impair the coagulability of fibrin and embarrass the nutritive function. Their presence, in due proportion, appears to be requisite to the health of the blood, in preventing its putrefaction, and favoring its oxygenation in the capillaries of the lungs. They also furnish elements to most of the tissues, which elements must be wanting, in so far as the saline ingredients of the blood are deficient.

3. *Abnormal character of the constituents of the blood.*—The influence of foreign substances, introduced into the blood, in modifying the character of its solid and fluid portions, has already been stated as fully as is deemed necessary for our present purpose. Very manifest changes are known to occur in the quality of the different ingredients of the blood, without regard to increase or diminution, or to the presence of extraneous substances. The causes of such changes, and the manner of their production, are, however, in many instances, very obscure. It is highly probable that they depend for the most part, upon morbid conditions of the tissues in which the blood circulates. While circulating in the capillaries,

and yielding the materials for secretion, the blood undergoes some important changes, even in perfect health,—changes which cause the difference between arterial and venous blood,—and it is not difficult to conceive the possibility of such modifications of the vital actions, by which these changes are produced, as would materially alter one or more of its constituents.

The blood is an elaborated fluid, produced from raw materials introduced through the digestive apparatus, or from the lymph, taken up by absorption from the tissues, and returned to the blood-vessels by the lymphatics. The materials, of which it is to be formed, must undergo several successive processes of modification and development before they can assume the character of normal ingredients of healthy blood. The albuminous elements of food are materially modified in their passage through the liver and lungs before they can enter the general circulation; the oleaginous portions must be emulsified by the pancreatic juice before they can be even absorbed by the lacteals; and, after this, are required to pass through the elaborating mesenteric glands, and to unite in the thoracic duct with the lymph, by which they are further modified before they enter the current of the blood. Other interesting physiological functions might be mentioned, each and all of which are indispensable to the elaboration of the blood, but these are sufficient for illustration. Now, the failure of any of these steps, in the elaborative process, and especially the abnormal performance of any of these functions, may result in the production of blood essentially differing, in the character of its ingredients, from a normal specimen of that fluid.

But there can be no doubt that the blood, after having been duly elaborated, and while circulating in the blood-vessels, may be subjected to influences capable of greatly modifying its elements, and indeed of completely revolutionizing its constitution. The condition of the blood-vessels, of the tissues in which the capillary system exists, of the nerves which modify all the vital actions of the body; the state of the body, or of portions of it, as influenced by heat, light, and electricity; all must have something to do with the maintenance of that equilibrium of the blood upon which its healthful qualities depend. The most subtle and perhaps inappreciable influences may essentially modify one or more of its elements. The influence of the nervous system is certainly very great in this respect. If a sudden emotion may cause the cheek to become pale, the heart to palpitate, or the stomach, bowels and bladder to

discharge their contents, may not even mental actions modify the condition of those minute organs, by which the tissues are formed, and the vitality of the circulating fluid is sustained.

The changes which occur in the blood are various and difficult of specification. The color often becomes much darker than it is in health, and in some diseases it is almost black, owing, doubtless, to modifications of the coloring matter, and in some instances to disintegration and solution of the red blood-cells. The coagulability of the blood may be greatly modified, not merely, as it is said, because of increase or diminution of the fibrin, but because of some peculiarity in the quality of that substance. It is sometimes found coagulated and occasionally even organized within the blood-vessels, but it is much more frequently rendered incapable of coagulating perfectly by the low state of vitality which exists in the blood, owing probably to the influence of putrifying and devitalizing processes going on in the solids. But it is unnecessary to pursue this subject further, for it is evident to any thinking mind, that a fluid like the blood, possessing a high grade of organization, and subject to all the vicissitudes incident to its circulation in the diversified organs of the human body, and which, when withdrawn from the vessels, or removed from the influence of the nervous system, or what is sometimes styled the vital forces, at once commences the process of spontaneous decomposition, must be subject to innumerable causes tending to modify its character, and must, on the other hand, be constantly impressing its own condition upon the susceptible organisms with which it is brought in contact; in other words, that derangements of the organs of the body must produce changes in the condition and qualities of the blood, and that morbid states of this universally pervading fluid must have much to do in the production of disease throughout the system.

LECTURE III.

GENERAL PATHOLOGY—CONTINUED.

On disease of the Solids: Preliminary Remarks; Disease from Mechanical and Chemical Causes; Disease resulting from modifications of vital properties; Functional disease; Elementary Morbid changes. Diseased Irritability.

ON DISEASE OF THE SOLIDS.

Preliminary Remarks. It may be proper here to repeat what was said in a former lecture, that serious disease of either the fluids or the solids of the body, seldom exists without both being to a greater or less extent deranged, and that it is often difficult, and even impossible, to determine, with certainty, in which the morbid change originates. Still it is well to study the peculiar conditions of all portions of the system under the influence of disease, as in this way we may be able, approximately, to comprehend the elementary principles of pathology.

The solids and soft solids of the human body are all, as a matter of course, subject to all the casualties resulting from mechanical and chemical influences, to which matter generally is exposed, and the processes of vital action are to a great extent efforts of the living organism to resist the tendency to destruction or injury from such influences. So long as a proper balance is maintained between the antagonistic forces, the body is maintained in a state of health, but as soon as this equilibrium is destroyed derangement ensues, which if continued constitutes disease. If the mechanical or chemical forces, exerted upon any part of the organism, be sufficiently powerful, to permanently arrest vital activities, death of that part must follow, and when this is not the case the effort at resistance may tax the vital functions beyond the power of the organism to sustain it, and although these functions may under such circumstances be performed, for a while, with excessive activity, they afterward fall, more or less, below the standard of health, or else become perverted in their character. Either of these three conditions constitutes

functional disease. Such modifications of the functional activities may also result in alterations of structure, even when arising from causes which can not be definitely assigned.

Diseased conditions arising from Mechanical and Chemical causes.—

The immediate effects of mechanical and chemical causes so far as they result in injuries to the structures of the body constitute surgical affections, whereas their secondary influences, which modify the vital properties of the tissues, fall properly within the range of pathological study and medical practice. It will not therefore be necessary to dwell at length upon the various forms of injury to which the body is liable from these causes, though it may be proper to enumerate some of the more prominent.

Injuries may result from external violence, as bruises, wounds, dislocations and fractures. These require the hand of the surgeon for their immediate management, but the secondary results often require the interposition of medicine; and since the duties of the surgeon and physician are often required of the same practitioner, it is important that every medical man study them with reference to both modes of treatment.

The same remarks are equally applicable to injuries which frequently result from the decomposing action of powerful chemical agents. These may produce their effects in different ways. Thus they may possess so strong an affinity for some of the elements of the tissue to which they are applied, as to enter into combination with it in spite of the resisting vital force, or they may exert such an influence upon one or more of the constituents of the part, as to cause them to enter into new combinations with each other, inconsistent with the continuance of life, and, in either case, cause the death of so much of the structure as is subjected to their influence. This constitutes as truly a surgical injury as does the destruction of the same amount of structure by mechanical force. Unless, however, the chemical influence be sufficiently potent to destroy the affinities of the constituents for each other, as they exist, and are sustained by the vital forces, the result will be mere irritation and not destruction, though, if the irritating influence be carried to a certain extent, an excessive activity may be produced, which may soon or late exhaust the vitality, and death of the part be the result.

The physician should never forget that the physical laws, pertaining to matter generally, are constantly operating in the living body as well as out of it, and producing their natural results, except in so far as the vital forces counteract or modify them.

When a cadaver is permitted to lie in one position for a time, you have all observed how all the fluids settle down to the lowest parts. Just the same tendency exists in the living body, but during the maintenance of vigorous health, the counteracting forces of the body sustain the fluids, and even transfer them from place to place in opposition to the laws of *gravitation*. But when the vital powers have become, in a measure, exhausted by long-continued action, as when an individual remains standing upon his feet during too long a period, the fluids tend to gravitate to the lowest parts, the veins become distended, absorption is partially or wholly suspended, and œdema is the consequence. This may occur in ordinary health, but it very frequently happens in debilitated states of the system, and sometimes gives rise to very serious difficulty, such as varicose veins, swelling and even loss of vitality in the lower extremities, etc.

Physical obstruction may prevent the fluids of the body from flowing in their appropriate channels, and in this way produce disease in the parts from or to which such fluids should pass. The *venous* trunks may be pressed upon by tumors, hypertrophied organs, the gravid uterus, etc., and congestion of the parts which should be drained by the obstructed current, must of course follow, and effusion of blood or serum, derangement of function, and even loss of vitality may ensue. Similar obstructions to the current of blood in *arterial* trunks, cut off the supply of blood from the parts to which the branches of the obstructed arteries are distributed, and may thus cause atrophy, or even death of the parts, if the current of blood be totally obstructed. This does not, however, often occur, for most parts of the body are supplied by anastomosing arteries, with a sufficient quantity of blood to maintain vitality, even when the principal artery is obliterated. When the lymphatic vessels are obstructed, the parts beyond the obstruction become tumefied from the accumulation of the fluids that exude from the capillary blood-vessels, and which should be absorbed and returned to the circulation by the lymphatics.

It is scarcely necessary to enumerate the various causes that may produce these mechanical obstructions. Any thing which obliterates or materially diminishes the caliber of a vessel, is such a cause. Thus, ligatures, tight-lacing, pressure upon the surface of the body over the course of a vessel; or tumors, enlarged or indurated glands, aneurisms, the gravid uterus, thickening or contractions

of vascular walls, and coagula lodged within the blood-vessels, may produce the obstructions of which I have been speaking.

The circulation of the blood may be obstructed also by structural disease of the heart, preventing its free transmission through that organ. The capillary system, too, may be the seat of impediment so that the blood can not readily pass over from the afferent to the efferent blood-vessels of an organ or part. This form of physical obstruction is more likely to occur in capillaries receiving venous, than in those receiving arterial blood. Thus the capillaries of the liver are not unfrequently rendered incapable by irritation, debility, or other causes, of transmitting the blood conveyed to them by the portal vein, and the immediate consequence is *passive congestion* of the veins of all the chylo-poietic viscera. Obstruction from any cause of the capillaries of the lungs, produces, of necessity, congestion of the pulmonary artery, right side of the heart, and the entire venous side of the systemic circulation. This accounts for the fullness of the veins and livid hue of the skin in cases of asphyxia.

The excretory ducts of glands are also liable to mechanical obstructions. In cases of this kind, the fluid, which should pass off through the obstructed channel, accumulates in the vessels behind the impediment, and may cause more or less distension, according to the quantity secreted. In some cases the distended vessels give way and allow the fluid to escape into the cellular tissue surrounding them, or into an adjacent cavity, producing serious results. If the obstruction remain for a considerable time, the retained secretion or some of its constituents may be taken up by absorption and re-enter the blood, and thus contaminate that fluid. The detention of the secretion also tends to arrest the function of the gland, and if its office is wholly or partially depurative, those substances which should have been eliminated from the blood are permitted to accumulate, and thus such obstructions may result in the vitiation of the circulating fluid, in a two-fold ratio, by absorption on the one hand, and by failure of elimination on the other. Every physician is familiar with instances of yellow skin, and general nervous derangement following obstructions in the gall-duct. Obstructions of the ureters cause equally if not more serious derangements in the same way.

These obstructions may result from pressure of tumors upon the ducts, structural changes or spasmodic contractions of their walls,

or the presence within them of thickened or solidified secretions, or of calculous formations.

I will merely add under this head, that the larynx, trachea, bronchial tubes, œsophagus, and small and large intestines, are each and all subject to obstructions by pressure from without, alteration in the walls of the passages themselves, by foreign bodies lodged within them, by accumulations of morbid or altered secretions or excrementitious matters. The pathological consequences are inseparably connected with special diseases, and it is unnecessary to occupy time with them in this part of our course.

Disease resulting from Modifications of the Vital Properties.—We now enter upon a field of research which seems to be more legitimately within the province of pathology than either of those we have passed over; for no changes in the blood, nor modifications of the solids, by mechanical or chemical means, are of much interest, in a pathological point of view, except in so far as they tend to embarrass or modify those vital activities by which health is maintained, thereby causing them to become sources of pain or danger, instead of means of comfort and self-protection.

Before entering upon the consideration of disease resulting from modifications of the vital properties of the tissues, it will be well to call to mind a few of the clearly settled physiological axioms pertaining to the living organism. Some of these have been already casually mentioned, but it will facilitate our labors to embody in a few sentences, those which stand in most intimate relation with the phenomena which characterize abnormal conditions.

1. Each tissue in the body possesses assimilative power in its healthy state, by which it habitually appropriates to its own growth, before maturity, and to its renovation at all times, so far as required, those portions of the circulating fluid which are adapted to its wants. This is the ultimate act in the function of nutrition, and is often spoken of as constituting that function.

2. Every tissue in the body undergoes waste of substance in the discharge of its normal functions, and the amount of waste bears a close relation to the degree of vital activity which the functional duty involves. Hence, some of the tissues undergo this process of destruction and renovation much more rapidly than others. Those textures, the office of which is principally mechanical, as the bones, cartilages, and ligaments, being much more permanent than those engaged in the functions of secretion, motion, and sensation, as the

glandular, muscular and nervous structures. It follows also that the more functional duty any organ may perform within a given period, the greater will be the loss of substance during that period, and the more material will need to be appropriated by the nutritive function for its repair.

3. As a necessary pre-requisite to the performance of function, the organism must possess a degree of excitability, by which is meant susceptibility to impressions which impel it to act. This is a property totally wanting in dead matter, but though its presence is indispensable to vital action, its temporary suspension may, under certain circumstances, be endured without the destruction of life.

4. The excitability of living tissues is diminished by excessive stimulation, and by the functional activity which is thereby induced, but is increased, within certain limits, by rest or exemption from stimulating impressions.

These known properties of vital organisms may be taken as our starting point in the inquiries we are about to make, in regard to the general pathology of vital actions. When all the processes involved in the nutrition and renovation of an organ are performed in such a manner as to secure and maintain its normal development and fitness for functional duty, the organ may be safely regarded as in a physiological or healthy condition. While in such condition, the functional activity of the organ may be increased or diminished, within certain limits without any departure from health. The nervous, muscular, glandular, or any other functions, may vary in healthful activity to a very considerable extent, in accordance with the demands made upon them, as we know by daily experience in our own persons; and there can be no doubt that the less observable, but equally important processes connected with the transformation of the elements of the blood and the removal of worn out or surplus matters from the tissues, are susceptible of similar variation within the boundaries of health, so long as the exaltation or diminution of functional activity depends upon the requirements of the body, and so long as the changes are not so great as to impair either the structure or vital properties of the acting organs.

FUNCTIONAL DISEASE.

Elementary Morbid Changes.—We are now I think prepared to consider in what ways the vital actions, which are the expression

of the vital properties, and hence furnish the most reliable index to the state of the organism, may be so altered as to become abnormal or pathological. We shall find that every conceivable modification of those processes, by which the vital properties are manifested, may be embraced under three specifications: 1, Morbidly increased or excessive action; 2, Morbidly diminished or defective action; 3, Perverted action. As before stated, increase and diminution may take place within the limits of health, but if carried above or depressed below the line of ease and safety, each becomes abnormal, and unless the change is speedily corrected, must constitute disease: perversion necessarily implies disease.

These three changes may be regarded as the primary elements of functional disease. I say they may be so regarded for the present and for convenience sake, but they are not strictly the ultimate elements. As in chemistry, many bodies once regarded as simple have been demonstrated to be compound, and as it is probable that the nomenclature of that science is destined to undergo further changes in the same way, so our views of disease have been, and are likely to be still more modified, as the science of pathology progresses toward perfection. The three conditions I have mentioned as primary elements of functional disease are truly such, so far as the vital *actions* are concerned, but behind these actions lies the *condition* of the organ by which the actions are performed, and which must be altered in some way from the state of health, before the vital functions can become increased, diminished, or perverted into pathological actions.

This consideration has led some writers to assert that *structural* changes always precede *functional* derangement, and that the elements of disease are to be found in modifications of structure. This I think does not necessarily follow. We may contemplate any living tissue in reference to three circumstances: 1, Its physical composition, or structure; 2, The vital condition, of its component elements; 3, The functional actions performed by it. It is easy to see that change, in regard to the first of these circumstances, requires increase or diminution of the substance of the tissue, or else the deposit of some element not normally present. Such would be a structural change, and must from the very nature of the case be more or less permanent. If ever corrected, structural change must again occur, which necessarily requires time for its accomplishment. But the *vital condition* of the tissue may be altered without the transfer of ponderable matter: heat, light, electricity.

and perhaps other imponderables, may exert influences sufficient to materially modify the vital properties of the structure without changing the physical organization, and so long as such influences are in operation, and the modification of vital condition produced thereby endures, the functional action must be correspondingly changed. Such affections are sometimes so evanescent as to attract very little attention, which could not be the case with structural disease of sufficient gravity to produce the same symptoms. As the vital properties of each tissue are in some respects peculiar to itself, it is impossible to generalize these elementary morbid changes by the employment of terms that shall convey full information as to the condition of each tissue when in a state of disease; so that it will be necessary for us to go somewhat into detail in studying the peculiarities of the primary elements of disease as existing in different organic structures. I shall therefore present what I have to say on the primary elements of functional disease in the following order:

DISEASED IRRITABILITY.

1, Diseased Irritability. 2, Diseased Tonicity. 3, Diseased Sensibility. 4, Diseased voluntary motion. 5, Disease of Reflex and Sympathetic Nervous influence. 6, Diseased Secretion.

1. *Explanatory Remarks.* The vital property denominated irritability is, by writers generally, attributed exclusively to muscular fiber, though some hold to the opinion that the property resides in the nervous fibrils distributed to the muscular tissue. This is a question which does not require to be settled at present, even if it were in my power to decide it with certainty. I will state, however, that from all I have read and observed, I am well convinced that muscular fiber does possess inherent irritability, and that the nervous influence acts as a stimulant, producing muscular contraction. After the nerves distributed to a muscle have been tied or cut off, this property of contracting upon the application of a stimulus directly to the muscular fiber remains for a time. Even after all the vital powers of the nervous system have been arrested under the influence of a narcotic, the muscles retain this property for a short period.

This property of irritability upon which the contractility of muscular fiber depends is sustained alone by due nutrition, and hence a constant, adequate supply of blood is requisite to its continuance. But this is not all. Every contraction of muscular fiber wears out, as it were, a portion of its substance, which must be

promptly disintegrated preparatory to its removal ; and oxygen is required to effect this. Hence a due supply of arterial blood is indispensable to the maintenance of muscular irritability.

It is proper here to remind you that this tissue, denominated muscular fiber, is not confined to those fleshy masses called muscles. It is an element in all the organs that possess the property of contractility. It forms a part of the wall of the intestinal canal, of the blood-vessels, air-passages, excretory ducts, glandular parenchymæ, etc., etc. Hence when I speak of disease of this property of contractile fiber—irritability—you must not limit the affection to disorder of muscular motion, in the sense usually applied to that expression, although such disorder being more readily observed, may be generally referred to in illustration of the affection.

Disease of Irritability manifests itself in the three ways heretofore mentioned; *i. e.*, morbid increase, morbid diminution, or perversion. In other words this property, when diseased, is either Excessive, Defective, or Perverted, the last condition being mostly exhibited in the extreme results of the first.

Excessive Irritability is a condition of the muscular tissue which seldom, perhaps never occurs, except as an attendant upon disorder of the nervous functions. Still it should be regarded as an element in many diseases characterized by unnatural muscular contractions. Its existence is manifested, 1, by a tendency of the muscles to contract with inordinate force ; 2, by their acting with abnormal quickness or promptitude ; or 3, by their remaining in a state of contraction longer than they would if in perfect health.

The *cause* of every form of muscular irritation may exist in the supply of blood as to quantity and quality, or in irritation of the motor nerves by which the affected muscles are excited to act. The excessive strength or force of the contractions probably depend chiefly upon the quantity, quality and movements of the blood supplied to the muscles ; while their brevity or permanency may, in part, be referred to the condition of the nerves which control the affected muscles.

The nervous system is without doubt deeply implicated in every form of muscular disorder. The property of irritability resides, it is true, in the muscular tissue, but it is under the influence and control of the nerves distributed to it, and it is often difficult to say whether the apparent muscular disorder is not merely a symptom of nervous irregularity. The muscular irritability may be exhausted by excessive nervous irritation, keeping the muscular

fiber in a state of unremitting activity—and on the other hand, the irritability of the muscular tissue may accumulate under a suspension of volition in cases of disease of the brain, and is then ready to manifest itself in response to reflex impressions through the spinal nerves.

The therapeutic measures which tend to diminish muscular irritability, are illustrative of the principles just enunciated. Where the cause is too great activity in the circulation of the blood, or the too stimulating character of that fluid, such measures as diminish vascular excitement and modify the properties of the blood itself, as saline cathartics, diaphoretics, diuretics and cardiac sedatives, with the cool or tepid alkaline bath and light diet, are generally effectual. Where the symptoms are local and dependent upon determination of blood, the circulation must be equalized by the warm bath, revulsive applications to the extremities, and by pressure or the cold douche upon the part affected.

Where the cause is nervous irritation, sedative remedies tending to quiet nervous excitement are to be employed. In many cases such relaxants as lobelia, gelseminum and even tobacco, succeed admirably in arresting the symptoms. Chloroform, too, is a valuable agent for that purpose. The narcotics are generally useful in these conditions, and some of them have even acquired the name of anti-spasmodics from this fact. Where irritability and debility co-exist, chalybeate and vegetable-bitter tonics are indicated. But I can not do more in this part of the course than intimate the general therapeutic relations of these elementary constituents of disease.

Defective contractility is a morbid condition more readily appreciated than that of excess. Its manifestations are either want of muscular force, or tardiness of movement, and it is an element in many diseased states of the system. It may be induced suddenly by intense nausea, fatigue, mental emotion, loss of blood or arrest of the circulation, and some of the narcotics, especially tobacco and sulphureted hydrogen. Concussions of the system and mechanical injury to particular muscles have the effect of producing direct depression of contractile power. Its extreme manifestation is seen in paralysis; though even there the property is not always entirely lost; for paralyzed muscles will often contract under the stimulus of galvanism, when the nervous system has lost all control of them. It may be induced gradually by habitual inaction, and there is no doubt that torpidity of the bowels is often caused by defective irritability of the muscular coat, caused by habitual neg-

lect to respond to the demand for defecation. Excessive purgation may have the same effect by exhausting the muscular irritability. Tardiness of the muscles to contract under the influence of ordinary stimulation is produced by opium and some other narcotics, and by the benumbing influence of cold. *Veratrum* and *digitalis* produce tardiness of the heart's action, without materially diminishing its force.

The therapeutic indications are to remove depressing causes, secure a free circulation of healthy blood, and where the condition is in any degree permanent, regular exercise of the system at large, if there is general muscular depression, and of the debilitated muscles when the affection is local. For cases of sudden loss of strength the diffusible stimulants, sudden application of cold water by dashing it upon the surface, friction and stimulating liniments are useful.

Perversion of the vital contractility of muscular fiber, is doubtless an element in many affections characterized by convulsive and spasmodic action. The *clonic* spasms of chorea, epilepsy and convulsive hysteria, although dependent principally upon nervous disorder, are evidently attended by a disordered condition of the muscular fiber. The same is no doubt true of cramp or *tonic* spasms.

LECTURE IV.

GENERAL PATHOLOGY—CONTINUED.

Functional Disease, continued: Disease of Tonicity; Disease of Nervous Functions; General Observation; Diseased Sensibility; 1, Diseased General Sensibility; 2, Diseased Local Sensibility; Diseased Voluntary Motion; Diseased General Voluntary Power.

II. DISEASE OF TONICITY.

Explanatory Remarks.—The profession has long been accustomed to employ the words tone and atony, tension and relaxation, as expressive of different conditions of the system; but very few appear to possess a clear apprehension of their physiological and pathological signification. There is certainly a vital property inherent in all the tissues possessed of any degree of contractility, by which, when in health, they sustain themselves in that state of tension most favorable for ease and functional duty. Every organ has its normal or characteristic tension, sustained by the properties of its component tissues. This property, which thus keeps the tissues in a state of normal tension, is denominated *tonicity*. It differs from irritability in the fact that it is not confined to muscular fiber, and is increased by cold, which diminishes irritability, and is diminished by heat, which increases that property. It differs also from mechanical elasticity, inasmuch as it remains after irritability has departed, as seen in the *rigor mortis*, but is lost before putrefactive change commences. (*Carpenter.*)

It is possessed by muscular fiber, but is manifested, not under the influence of a stimulus, but in the ordinary quiescent state, in maintaining that degree of firmness and contraction which characterizes the muscles in a state of rest. Thus it places the limbs in the easy position of semiflexion, supports the viscera of the abdomen, yields steadily to the traction produced by the contraction of an antagonizing muscle, and returns the muscle to its natural position when the extending force ceases. It keeps the walls of blood-vessels contracted upon their contents, and restores the air-tubes and

air-cells of the lungs to their smallest dimensions after their distension by air. It exists in the excretory ducts and secreting structure of glands, in the walls of the intestines, and is eminently present in the sphincters that control the outlets. The skin also possesses it in a high degree, especially in youth, as may be seen by the promptness with which it returns to its natural dimensions after being put upon the stretch, and by its contraction under the influence of cold, which, while it expels the blood from the capillaries, causes the skin to present the peculiar appearance denominated *cutis anserina*.

Excessive Tonicity.—When this property is in *excess* it produces a state of unpleasant and abnormal tension throughout the parts so affected. The muscles are unnaturally firm, and their movements are difficult and painful. The pulse is hard and tense, the arteries scarcely yielding to the heart's impulse, so that there is little or no difference in time between the contraction of the heart and the pulsation at the wrist. The capillary circulation is rapid from diminution of the vessels, and the vascular system, if generally affected, is in a state of pressure which may be too strong for some of the weaker parts, and these giving way may become overdistended, producing congestion, or ruptured, causing extravasation, or hemorrhage.

This is a predominating element in what is sometimes called inflammatory fever; not as a cause, but as an effect of the febrile excitement. It may result from over stimulation, by food or drinks, especially when not accompanied by sufficient exercise. The presence in the blood of irritating substances, such as an unusual amount of lithic or lactic acid may cause it. You see then that it is a state of the system likely to be induced by such habits as produce imperfect assimilation or defective elimination; and its chief phenomena are those usually indicated by the term *irritation*, as preceding inflammation or attendant upon it in the form of symptomatic fever.

Remedies.—In illustration of this morbid state I will just remark that the most effectual and permanent relief for it is found in medicines and measures that tend to produce relaxation; such as relaxing emetics, aperients, the tincture of gelsemium, the warm bath, either with the sponge, by immersion of the whole body, or the application of the vapor of burning alcohol; and such as favor excretion, as diaphoretics, and especially diuretics.

Excessive Tonicity. This is characterized by unnatur^l

tion of tissues. The muscles are soft and flabby, and continued contractions can not be maintained by them. They are often at the same time irritable, so that there is that peculiar tremulousness, characteristic of debility. The heart and vascular system generally partake of the same condition, so that there is apt to be palpitation, a soft pulse, either slow and full or frequent and small, but always yielding readily to pressure, and easily excited to frequency. The arteries do not in this condition sufficiently resist the heart's impulse, and consequently there is an increased period between the heart's contraction and the pulse at the wrist, and a portion of the cardiac impulse is lost—precisely the opposite of the fact stated under the head of excessive tonicity. Sometimes the artery is so much distended by the heart's action, that its mechanical elasticity comes into play before its tonic contraction, and in this way a kind of double, or, as it has been called, *dichrotous* pulse is produced.

The consequences of this morbid state are coldness of the extremities from enfeebled circulation, internal passive congestions, and faintness or giddiness upon any sudden exertion. It may be principally confined to a particular organ or apparatus, as the stomach and bowels, causing dyspepsia, costiveness and flatulency. A particular muscle may be affected in this way, giving preponderance to the opposing muscle and causing distortion, as of the eye in strabismus.

Such a state of the system renders it peculiarly liable to various forms of disease from its inability to resist such morbid causes as malaria, infection, and the depressing influence of vicissitudes of the atmosphere, mental emotions, etc.

Want of tonicity is caused by the depletion of blood-letting, hemorrhage, or excessive secretion, by debilitating disease, want of proper nourishment, confinement to prison or to sedentary habits, and by depressing passions, such as fear, grief and despondency.

In cases of temporary depression of tonicity, the sudden application of cold will often produce an immediate beneficial effect, and even in cases where this state is brought on by debilitating causes, the daily use of a shower bath is generally attended with improvement. Saline bathing and friction of the surface are also useful measures. Moderate exercise in the open air, especially when the atmosphere is pure and bracing in its character, is another hygienic measure of great importance to patients in this

condition. These, with as generous diet as the digestive organs can manage, and the use of iron and the vegetable bitters to improve the quality of the blood and invigorate the tissues, are found to constitute the only successful treatment for this morbid condition of the general system, and fully confirm the view now entertained of its pathological nature.

Let us now pass to the consideration of those modifications of vital properties, pertaining more exclusively to the *nervous* system.

DISEASE OF THE NERVOUS FUNCTIONS.

General Observations. It will save the necessity of considerable repetition to present in this place some remarks applicable to all forms of nervous disorder. The conditions requisite to the normal discharge of the nervous functions, and so far as we at present know, the vital actions that occur in nervous substance, are entirely similar, whether the function performed be that of receiving impressions or generating nervous influence; and consequently a description of the pathological changes affecting one of those functions is, to some extent, applicable to those modifying the other, the difference consisting in the locality, rather than in the character of the lesion.

Healthy activity of vesicular nervous substance evidently depends on a due supply of blood, and that of a pure quality. Morbid changes of the circulating fluid, whether those changes consist in alterations of the natural constituents of that fluid, or the introduction into it of substances not normally present, derange the functions of the nervous substance more readily than those of any other tissue in the body.

There are certain conditions connected with the circulation that increase, and others that diminish, the activity of vesicular nervous substance. The former effect is produced by increased circulation of blood through the part, and by the presence in it of certain stimulating agents as phosphorus, ammonia, nitrous oxide, strychnia, etc. The conditions that diminish the nervous function are retardation of the blood, and the presence in that fluid of substances that exert a direct sedation on the nerve-vesicles, as carbonic acid and the excrementitious substance left in the blood by failure of elimination through the skin, liver, kidneys, etc. Hydrocyanic acid, creosote, aconite, etc., appear to produce direct sedation.

But the nervous substance is often the seat of peculiar ma

changes which can not be attributed to increase or diminution of the blood circulating in it, nor yet to the influence of disturbing agents conveyed to it by the blood-vessels. Changes in the condition of the nervous structure are as often the cause as the result of changes in the movements of the blood in the part affected, and no doubt often originate those derangements of the eliminatory organs by which impurities of the blood are caused. Heat, light, electricity, mental emotions, painful and irritating local affections, etc., appear to exert their influence directly upon nervous structures independently of the blood-vessels, some exalting and others depressing its vital activity.

As different parts of the nervous system perform different functions, so disturbing influences must produce different manifestations, according to the part upon which they are exerted. Thus, any disorder of the vesicular substance of the sensory ganglia at the base of the brain is evinced by diseased sensibility, but the same morbid change in those portions of that substance in which motor power is generated, is manifested by derangement of muscular motion. Morbid conditions of the fibrous or white nervous structure modifying its conducting property, are of course attended by different effects, according as they involve the sensory, or the motor fibers, or both.

Having said thus much on disease of the nervous functions generally, let us now briefly consider some peculiarities connected with morbid states of individual nervous functions.

III. DISEASED SENSIBILITY.

Morbid sensibility may affect the system at large or only particular parts. The subject, therefore, naturally divides itself into two sections; 1, Diseased General Sensibility; 2, Diseased Local Sensibility.

1. *Diseased General Sensibility.* The seat of general and of special sensation is the gray substance of certain ganglia at the base of the brain. To these may be traced all the nerve-fibers through which impressions are received. Cut off the connection of any organ of the body with this group of ganglia (styled from its function the sensorium), and all sensibility in that part is lost. It follows then that if the property of sensibility is generally disordered, we are to look for the seat of that disorder in the common focus of all the sensory nerve-fibers, the sensorium. The property of that portion of the gray or vesicular substance of

being influenced by impressions through the different nerve-fibers, is what is meant by sensibility, and this property is liable to be morbidly increased or diminished, or to be perverted.

Increase or diminution of sensibility is not necessarily disease, for, like other vital properties, it is subject to considerable fluctuation during the continuance of health; but when the change in either direction is so great as to produce discomfort or functional disorder, it must be regarded as morbid. Perversion of sensibility is disease, of course, and may be characterized by either increase or diminution.

After what was said in introducing the subject of nervous disorder (page 77), it will not be necessary to occupy time with remarks on the causes of the morbid changes, and I shall, therefore, limit myself to the effort of illustrating in brief their existence and influence as elements of functional diseases.

Excessive Sensibility may be congenital, and persons so constituted are usually called nervous, from the great excitability which they manifest. Who has not observed a vast difference between different individuals, even in health, in this respect. A similar condition is very frequently the result of disease, and may become the permanent peculiarity of the individual thereafter. Such persons exhibit, even in their usual health, a morbid susceptibility, which, if suddenly induced in persons of ordinary nervous sensibility, might be regarded with much solicitude, but which, when known to be the usual condition, causes little concern, and in some cases subjects the sufferers to ungenerous taunts or innuendoes. The constant complaints they utter, about matters which to others appear to be trifles, but which to them may be sources of torture, renders their society disagreeable to those about them, while their own lives are burdensome to themselves.

When such persons are attacked with disease, nervous symptoms usually preponderate, and may obscure the real malady, directing the attention of the physician to the nervous centers as the seat of the difficulty, when perhaps it occupies a very different locality.

Excessive sensibility seldom exists alone, but is usually associated with increased irritability and deficient tonicity, together with derangement of the nervous functions, hereafter to be considered; especially of reflex action and involuntary motion. The symptoms of the affection we are now considering, consist principally of neuralgic pains, headache, great sensitiveness of the skin when touched, tenderness of the spine under pressure, etc. It is

developed in that state of irritation which precedes inflammation of the brain or its membranes, and in the early stages of fevers of high grade, and is manifested by intolerance of light, sound and touch, and inability to rest. It is not apt to exist as a distinct morbid affection in general plethora, although it is often an element of disease occurring in that condition of the system; sensibility being morbidly exalted contemporaneously with other vital properties. It is more likely to manifest itself prominently in *anæmia* and general debility, where it is often, perhaps, exaggerated by contrast with other vital properties in a state of depression.

The therapeutic indications may be stated in general terms. They point to such measures as will moderate vascular excitement in the brain, secure depuration of the blood, remove all causes of pain and irritation whether operating locally or generally, and whether predisposing or exciting, and produce a direct sedative influence upon the nervous system.

Deficient General Sensibility.—The locality of the pathological lesion in this case is also the cerebral sensory ganglia. There is in some persons a congenital deficiency of sensibility, indicated by obtuseness of feeling, and comparative exemption from pain under influences that produce suffering in ordinary cases. Such individuals are not so liable as others to attacks of acute disease, but when they are attacked, are apt to be negligent in regard to timely treatment from unconsciousness of their condition, and from this cause are, perhaps, in more danger than others possessed of more sensibility. On the other hand such a condition appears to predispose to apoplexy, congestions, indigestion, costiveness and the like.

Extreme manifestations of this affection are seen in coma, and in the stupor produced by narcotic poisons, and in the anæsthetic effects of alcohol, ether, chloroform, etc.

The causes of deficient sensibility in the nervous centers are those which have been already referred to as tending to depress the vital properties of nervous tissues. It may result from embarrassment of the circulation in the nervous centers, from impurity of the blood, and from morbid depressing influences exerted directly upon the nervous substance.

The therapeutic indications are to promote normal activity in the circulation by arterial stimulants and revulsive measures, to unlock any suspended secretions and excite the nervous centers to healthy activity by means of narcotic stimulants.

Perverted General Sensibility may be said to exist when an individ-

ual experiences sensations which evidently have their origin in the sensorium, instead of being produced by impressions conducted to it by the nerve-fibers. A patient may *feel* his surface to be cold when it is really excessively hot, or vice versa; or he may have the sensation of being moved upward, downward or in a rotary manner when his entire person is perfectly still. The *feelings* which he experiences are evidently owing to some perverted state of the centers of nervous sensibility. They are perhaps most frequently associated with increased sensibility. A rehearsal of examples is deemed unnecessary.

This condition of the nervous centers usually co-exists with more or less general functional derangement, and must of course be treated by attending to those conditions of the system which give rise to the sensorial disorder. The depraved appetite of some females during pregnancy, or while affected with uterine disease, and illusions of the special senses, are doubtless to be regarded as symptoms of perverted sensibility at the nervous centers.

The indications of treatment are to rectify functional disorder, purify the blood and strengthen the system by tonics, pure air, moderate exercise and nourishing food. Anodyne and sedative medicines may be used temporarily where the symptoms are very distressing.

Diseased Local Sensibility.—Little need be said under this subdivision of diseased sensibility, further than to remind you of the anatomical and physiological relations subsisting between the nervous centers and all parts of the body. Normal sensibility in each part is preserved only by maintaining the due relation of that part with the nervous center, through the nerve-trunks and branches. Irritate the nerve distributed to any part, and pain is felt in that part, and not only so but the sensibility of the part remains for a time increased; it is more tender and sensitive than before. Press upon the nerve and a perverted or unnatural sensation is produced, varying with the amount of pressure, from a mere unpleasant tingling to a feeling of numbness. Sever the nerve and feeling is destroyed.

This brief reference to the relations established by the nerves, will enable you to readily comprehend the conditions requisite to produce excessive, deficient and perverted local sensibility.

The cause of modified local sensibility may exist in that portion of the sensorium with which the affected part is connected,

in the connecting nerve or in the condition of the part itself. Disease of any one of the ganglia must derange the sensibility of the organ dependent upon it, whether that be an organ of special sensation or merely endowed with common feeling. Thus disease in one of the quadrigeminal bodies deranges vision in the eye of the opposite side, because the fibers of the optic nerves decussate between the optic nervous ganglia and the retinae. Not only has each organ of special sense its peculiar nervous ganglion, to which impressions from that organ are conveyed, but it is almost certain that every part of the body, endowed with feeling, has appropriated to it a point in the sensorium in which alone impressions from that part are recognized. If this be true, then it is easy to see how morbid local sensibility, whether special or local, may have its pathological seat in the sensorium without the sensibility of other parts being necessarily changed. All other portions of the sensory ganglia may be in a normal condition, while that appropriated to a particular organ or part is diseased. But sensibility in each locality of the body not only depends, for its healthy manifestation, upon the normal condition of the sensorium, but also upon the conducting property of the nerve connecting it with the nervous center. Irritation of the posterior columns of the spinal cord, or of the nerves connected with it, produces an impression in the sensorium which is at once referred to that part of the body to which the peripheral extremities of the fibers implicated in the irritation are distributed. Pressure upon the sensory nerves, or any other influence which interferes with the proper circulation of blood, or otherwise depresses their vitality at any point between their peripheral and central extremities, produces diminution of local sensibility in all parts whose relations with the nervous center is thus impaired.

But normal local sensation does not only depend upon a healthy state of the nervous centers and conducting nerves, but upon a like condition of the part where the impression is made. This consists, as in the sensorium and nerve fibers, of a due supply of blood, and a natural state of the nervous element of the part. There is now, I think, no question that vesicular or gray nervous substance is located at the peripheral distribution of sensory nerve-fibers, and this must be in condition to perform its vital actions, or sensation will not be produced in a natural manner.

The condition of which I am now speaking is sometimes mani-

fest by the occurrence of sensibility, more or less acute, in organs or structures destitute or very obscurely endowed with feeling in a state of health.

Inflammation occurring in the membranes, bones and cartilages, and the internal organs of the body, is attended by this phenomenon. Mere *irritation* in some parts has the same effect, as in colic, spasm of the stomach, the passage of biliary calculi, etc.

One of the most important duties of the practicing physician, in many cases, is the relief of pain. Not only should he be prompted to this by the natural sympathy of his nature, but he should bear in mind that severe pain is not only torture to his patient, but, in many instances, a serious element of disease itself. Its existence may interfere with the performance of important functions—as the pain in pleurisy with the function of respiration,—or its severity may overpower the nervous system, insomuch as to impair all the vital functions, producing fainting, and great, perhaps fatal, exhaustion. Hence in severe cases of neuralgia, gastralgia, dysmenorrhea, etc., it becomes important to arrest the painful symptom at once, irrespective of its pathological cause. In many cases, however, although a high degree of local sensibility may be present, it may be regarded as a mere symptom, and the treatment directed toward the removal of the disease which produces it.

Nothing will be gained by an attempt to indicate remedial measures in this connection. So far as regards the general principles of treatment for morbid sensibility, they have already been presented, and their application to particular cases and localities must be left till we come to treat of special diseases.

IV. DISEASED VOLUNTARY MOTION.

Derangement of function in the muscles of voluntary motion may depend in part upon disorder of the muscular irritability; which condition has already received our attention. But there can be little doubt that in disorders of these organs, the morbid condition more frequently exists in the nervous endowment than in the contractile fiber of the muscles.

The lesion which is manifested by disordered voluntary motion, where the nervous influence is at fault, may exist in the nervous centers, or in the nerves which are distributed to the muscles.

We have, therefore, the same natural division of the subject into general and local disorder as was made in treating of disease

sensibility. Indeed, the general principles in regard to the cause and nature of derangement of the sensory and of the motor functions are so nearly identical, that after what has been said in reference to the former, it is unnecessary to go into any detailed account of the pathology of the latter affection. All I shall do, therefore, will be to present some illustrations of derangement of motor power as an element in general and local affections.

Disease of General Voluntary Power.—That much difference may exist in the voluntary motor function, may be readily shown by reference to different individuals and to the same individual at different times, even in ordinary health. Some persons are capable of accomplishing much greater feats of strength and agility than others, where the difference can not be accounted for by any observable peculiarity of muscular development; their superiority being evidently owing to a degree of nervous energy, which enables them to control their muscles with such force and facility as to bring all their powers into service at will. Most of us are conscious of great changes in our own condition at different times in this respect. Who has not experienced at times an exaltation of voluntary motor power that rendered muscular exercise easy and even delightful; and who has not occasionally found it difficult to put forth the strength which he possessed, owing to a conscious depression of nervous energy. These may serve as examples of plus and minus voluntary power within the limits of health.

Morbid Excess in this function may exist in every degree, from that fidgety restlessness which is habitual with some persons, and which is present in some forms of disease, through all the fickleness of hysteria, the impulsive activity of mental excitement, and the phrensy of fever and delirium.

Instances of *deficiency of general volition*, as a simple or uncomplicated affection, are not so abundant as those in which it co-exists with derangements of other functions. In its simple form it implies mere loss of power to control the muscles, and such loss may be partial or total. Its slightest manifestations are languor or a feeling of inertia, as experienced in oppressive states of the atmosphere, or when the stomach is oppressed by over-feeding or by difficult digestion; and in the weakness and lethargy which follow excessive exertion. Its symptoms are more manifest in some cases of trance, catalepsy and night-mare, where although consciousness is retained, there is inability to move any of the muscles. It is evidently an element of the morbid states characterized by stupor,

as coma, narcotism, etc. It sometimes occurs very abruptly, as when a person is suddenly surprised or terrified to such a degree as to be unable to move. Your minds will readily appreciate the presence of this morbid element in a vast range of disordered states of the system to which it is not necessary now to refer.

Perverted voluntary power is sometimes seen in persons whose muscles contract under the impulse of volition, and yet do not strictly obey the will. One muscle may contract, when the action of another is required to produce the intended motion, or when a muscle has been called into action by the will, there is no power to control the force or rapidity of the movement. This condition is often associated with other functional derangements, as in chorea, delirium tremens, shaking palsy, and some forms of hysteria.

Where there is derangement of voluntary motion throughout the entire system, the pathological cause is to be looked for in the cerebrum. Volition is an intellectual act and can not be exerted in a normal manner unless the brain is in a healthy state. All the motor ganglia may be in so healthy a condition, that automatic movements may be produced in response to impressions transmitted to the cerebro-spinal centers by the nerves of sensation, in the absence of all power of the will to originate any muscular action whatever, whereas, if the brain is free from disorder, all the motor ganglia of the spinal cord and medulla oblongata must be at once diseased before a universal derangement of motor power can arise. Physiologists speak of voluntary and reflex muscular action, and the distinction is very convenient, and is correct in a certain sense; but in reality, voluntary motion is reflex action, in which the impression that causes it comes to the motor ganglion from the cerebrum, instead of from the peripheral extremity of an excitomotor nerve.

On the other hand, partial derangement of voluntary motion may depend upon pathological lesion in the motor nerve-center, with which the part in which the disorder of function is manifested, is connected by its motor nerve-fibers, in those fibers themselves, at either of their extremities, or at any intermediate point. It may also be caused by interruption of communication between the convolutions of the brain and the motor ganglion through which the volition should be carried into effect, or by circumscribed disease in that part of the cerebral convolutions, in which the voluntary impulse has or should have its origin. When the pathological

cause is located in one hemisphere of the brain, its manifestation is seen on the opposite side of the body, owing to the decussation of the motor fibres in the medulla oblongata. Perverted voluntary motion may often be referred to disease of the cerebellum, where the function of co-ordination of muscular movements is exercised.

The therapeutic indications for motor disorder have reference to the principles just announced. They vary, *first*, with the cause of the nervous disorder, as heretofore sufficiently explained, page 78; *second*, with reference to the character of the morbid change; *third*, with reference to the extent of the functional derangement, as determining the locality of the pathological lesion. The remedies will, therefore, be addressed to the vascular system, directly to the nervous tissue, or to both simultaneously, and will be general or local, or both, as the peculiarities of the case may require.

LECTURE V.

GENERAL PATHOLOGY—CONTINUED.

Functional Diseases, continued: V. Disease of Reflex Nervous Influence; Excito-Motory and Excito-Secretory Sub-Systems of Nerves; Increase of Involuntary Excito-Motor Power; Deficiency of Involuntary Excito-Motor Function; Reflected Sensibility.

V. DISEASE OF REFLEX NERVOUS INFLUENCE.

Excito-Motory and Excito-Secretory Sub-Systems of Nerves. As we have still two elementary forms of disease to consider—that of Reflex Nervous Influence, and that of Secretion—and as the nervous system is deeply implicated in both, I desire to present you with some further explanation of the nervous relations through which the phenomena of these morbid states are manifested.

In 1837 Dr. Marshall Hall announced the existence of an excitomotory system of nerves, and he has recently established, as I think satisfactorily, another sub-system, which he very properly calls the excito-secretory system of nerves.* As I can not do the subject justice so briefly and so well in any other way, I will read you part of an article from that great physiologist, recently pub-

* Dr. Henry Fraser Campbell, of Georgia, has addressed a letter to Dr. Marshall Hall, in which he claims priority over both M. Claude Bernard and Dr. Hall, in the discovery, naming, and announcement of the excito-secretory system of nerves; he having called attention to this system in 1850, and named it in 1858, as shown by "*Transactions of the American Medical Association.*" This letter is published in the *London Lancet* (August, 1867), in connection with a communication from Dr. Hall, in which he says: "The idea and the designation of an excito-secretory action belong to Dr. Campbell, but his details are limited to pathology and observation. The elaborate experimental demonstration of reflex excito-secretory action is the result of the experimental labors of M. Claude Bernard." * * * * "My own claim is of a very different character, and I renounce every other. It consists in the vast generalization of excito-secretory action throughout the system." * * * * "I trust that Dr. Campbell will be satisfied with my adjudication. There is in the excito-secretory function, as applied to pathology, an ample field of inquiry for his life's career, and it is amply ~~his own~~ *his own*. He first detected it, gave its designation, and saw its vast importance."

lished in the *London Lancet* (March 1857). After referring to his former discovery, he says :

“ I believe I may now announce a system or sub-system of *Excito-Secretory Nerves*, not less extensive.

“ As in the former case the pneumogastric was shown to be the principal, though not the only, internal *excito-motor* nerve, so in the present instance that nerve will be shown to be the principal, though by no means the only, internal *excito-secretory* nerve.

“ The external excitor nerves, in both cases, are the trifacial and the cutaneous spinal.

“ All of these nerves are chiefly centripetal in their course and action; all act *diastaltically* through the *spinal marrow* (the medulla oblongata and the medulla spinalis, inclusive), as the center or keystone of all the cycloidal nervous arcs of the system, and all act through the ganglionic system, as presenting the *centrifugal* nerves or portions of those *arcs*, the immediate secretory nerve, but excited into action by a remoter *centripetal* nerve.

“ Henceforth the Diastaltic Nervous System must be divided into two sub-systems :

“ I. *The Excito-Motory*;

“ II. *The Excito-Secretory*.

“ The former is extended to the entire muscular system; the latter is diffused over the general system as the blood is diffused over the system. Every capillary, or methæmatus, or blood-changing vessel, has its element of the excito-secretory system, the nervous methæmatus agent in every such change. The blood moves in *circles*; the excito-secretory sub-system acts in *cycloidal arcs*.

“ I proceed to give examples :

“ ‘ Every one,’ says M. Brown-Sequard, ‘ knows the singular alterations which take place in the *eye*, after a contusion of the *frontal* nerve, or a section of the *trigeminal* or of the *cervical ganglionic nerves*.’ ‘ I have found,’ adds this eminent physiologist, ‘ that after the section of a lateral half of the spinal cord, it sometimes happens that the *eye* on the same side will present strange and various changes. The part of the chord having this influence on the eye, lies between the *ninth* and the *twelfth* costal vertebræ.’

“ But *why* this same or similar effect from such various sources, no conjecture has hitherto been given. Yet, I think, every reader will at once perceive, when the fact is pointed out, that the trifacial nerve, the costal spinal marrow, and the ganglionic nerve, are but the centripetal, the central, the centrifugal portions of *one* continu-

ous cycloidal methæmatus arc, and that it is to a certain degree immaterial in *what point* of this arc the section is made!

"The pneumogastric nerve has been the enigma of experimental physiologists. It would be too long for me, on the present occasion, even to enumerate their varied and contradictory conclusions. I shall, therefore, only briefly state certain ultimate facts, which have resulted from these multifarious investigations:

"First, then, according to Dr. J. Reid, no effect on the lung is 'necessarily or even generally' produced by the division of ONE pneumogastric nerve, and the animal survives the operation.

"Secondly, Dr. J. Ried observes: 'Section of the pneumogastrics' (that is of *both* pneumogastrics) 'invariably proves fatal, if the cut ends of the nerves are kept apart.' And, 'The section of these nerves proves fatal by its effects upon the lungs.'

"But why does section of *one* of these nerves produce no effect on the lungs and on life, and the division of *both* so affect the lungs as invariably to prove fatal? I venture to reply—Because the pneumogastric is a *centripetal* nerve in this case, and that, when *only one* is divided, its loss is compensated for by the influence of the one remaining; but that, when *both* are divided, all *excitation* essential to the action of the center and centripetal portions of the arc, is excluded, and all methæmatus action prevented.

"But Dr. J. Reid has observed, that 'changes in the lungs do not necessarily follow the division of *both vagi* and recurrents.' ('*Researches*,' p. 216.) And Arnemann states that he has known dogs to survive that operation. In one of Dr. J. Reid's experiments the dog survived twelve days, and was then killed.

"Admitting these facts, how may they be explained? May not the trifacial and the cutaneous spinal nerves act as excito-secretory nerves, as they certainly do as excito-motory nerves? Nay, might not a dog be made to survive the division of both pneumogastrics, with loss of substance, kept in a cool atmosphere, by cautiously-repeated excitation of the cutaneous excitor nerves?

"But the most remarkable proof of the doctrine which I am endeavoring to unfold, is furnished by the brilliant discovery and the skillful experiments of M. Cl. Bernard.

"If the pneumogastric nerves be divided in the neck, the formation of sugar in the liver is arrested; if the *lower* portion of these divided nerves be galvanized, no effect is produced; but if their *upper* portion be galvanized, the formation of sugar is restored.

"By the division of the pneumogastric, then, the *exciting* cause of

the formation of sugar in the liver is *cut off*. This cause, according to M. Bernard, acts in the lungs, just as upward of twenty years ago, I first stated that the *usual* exciting cause of inspiration does. Its course is, in like manner, centripetal, along the pneumogastric nerve. Its place is, in some sort, supplied by galvanizing the *centripetal* portion.

“Again: The glycogenic portion of the liver is augmented by *exciting* a certain point of the medulla oblongata.

“Thus, we have *two* portions of the cycloidal nervous arc demonstrated. The *third* is, the ganglionic nerve, proceeding from the solar plexus to the liver; and the arc is complete.

“I must now observe particularly, that the excito-motory and the excito-secretory actions are frequently, perhaps generally, *combined* in living beings. Thus, a particle of sand exciting the trifacial of the conjunctiva, excites, through it, the facial and the ganglionic nerves, and produces, at one and the same time, an invincible closure of the eyelids and a copious flow of tears. Carbonic acid evolved in the lungs, excites the pneumogastric, and through it, the intercostals, the bronchial, and the ganglionic nerves, and inspiration, bronchial action and methæmatus phenomena.

“But the most extraordinary examples of excito-motory and excito-secretory action, reciprocally or combined, are represented by the *triple* system consisting of the ovarium, the uterus, excito-secretory in the mamma, chiefly.

“Other parts, not less remarkable, but of an order less connected *inter se*, are the effects induced by undue acidity in the stomach on the *action* of the diaphragm or heart, and on the secretion of the mouth or of the kidney.

“Not less remarkable is the *equally* allied series of motor and secretory phenomena, the result of mental *emotion*, constituting a most interesting subject of new inquiry.

“The pathology of the excito-secretory sub-system remains to be investigated and traced. A partial keen current of air falling on any portion of the skin, may induce inflammation in any susceptible internal organ. An extensive burn or scald is apt to induce pneumonia.

“In epilepsy, I have constantly observed that the secretions, as well as the movements, are morbidly affected, and especially those of the mouth, the stomach, the liver, the kidneys, both *before* and *after* the attack: an apple odour of the breath, a loaded tongue, undue acidity in the stomach, morbid alvine excretions, excessive

deposits of urates, are the most observable. The entire skin acquires at length a leaden hue peculiar to epilepsy, a hue which tracheotomy has removed, as in Mr. Mackarsie's well known case, while it restored the intellect.

"There is not, perhaps, a point in the general cutaneous surface in which tetanus—an excito-motor effect—may not originate; there is scarcely a part from which internal inflammation—an excito-secretory—may not be excited. There is no part of the muscular system which is not under the dominion of this excito-motor power; no part of the vascular system which is not linked with the excito-secretory sub-system."

The muscles of voluntary motion, as has been already stated, are brought into action by a nervous influence transmitted from the cerebro-spinal motor ganglia through the centrifugal or motor nerve-fibers. The impression that causes the generation of this influence may originate in the brain and produce voluntary motion, or in some other organ or part and cause involuntary or reflex muscular action. Any morbid state of the motor ganglia and of the motor nerves, therefore, that would modify voluntary motor power as expressed through those ganglia and nerves, must similarly modify reflex motor action. Thus an exalted condition of the vital properties of these ganglia and motor nerves, which are common to both voluntary and reflex nervous influence, must render them excessively susceptible to impulses from both directions, and we would therefore expect to see in such case exaggeration of motor action of both kinds beyond what would occur in a healthy state of the motor nerves and ganglia. Depression of vital property in the same localities would of course diminish both voluntary and reflex motor power in a similar manner and in a degree corresponding to the depression. The causes of morbid manifestations of reflex motor power, whether excessive or deficient, so far as referable to the spinal marrow and its centrifugal nerves, has been already sufficiently explained.

There is, however, another element in the theorem now under consideration that requires to be considered. The centripetal or excito-motor nerve fibers that terminate by one extremity in the cerebro-spinal centers, and by the other in the organs and tissues, and which are the media through which those impressions that excite reflex or involuntary movements are transmitted to the centers, may be the means of exerting excessive or deficient influence upon the nervous centers, and thus of modifying the action of

those centers, and consequently the manifestations of that action in the muscular movements. This modification of excito-motor influence may be owing to pathological change, or mechanical or chemical interference in the structure where the impression is first made, or at any point along the trunk of the nerve by which the impression is conveyed to the nervous center.

Increase of involuntary excito-motor power accounts for the occurrence of spasm of the throat and of the sphincters in hydrophobia, tetanus and some forms of hysteria (*Carpenter's Physiology*). The hurried respiratory movements, convulsive coughing, violent retching, hiccup, etc., that frequently occur in the affections just named and in other diseases characterized by nervous irritation, may be referred in part to the same pathological origin. I do not speak of cases where the movements are normally excited by sensation, as want of breath, tickling in the air-passages or nausea, but where there are either no such sensations to call forth the actions, or where the muscular movements are manifestly disproportioned to the impressions that give rise to them. In either case there is manifestly an exaltation of excito-motor function.

In many cases where volition and even consciousness are suspended by disease in the brain, or by cutting off the connection between the brain and spinal cord, exaltation of reflex nervous function is observable. In *paraplegia*, in which both sensation and voluntary motion are lost in the lower part of the body, the function of reflex action often remains, and is said to be sometimes more promptly developed by pricking, tickling, etc., than during sleep in a healthy person, or in the upper part of the patient's body, where no paralysis exists. In *hemiplegia*, the side affected may be totally insubordinate to the will and yet subject to convulsive movements so violent as to require confinement of the limbs to enable the patient to sleep.

Convulsions are now regarded by the most reliable pathologists as dependent on spinal irritation. Convulsive movements may be divided into three classes. 1. *Reflex*, resulting from some extraordinary irritant impression transmitted to the spinal cord. 2. *Centric*, depending upon a diseased condition of the ganglionic centers of the spinal cord. 3. *Reflex and Centric combined*, in which the nervous centers are morbidly excitable, and convulsions are produced by slight excito-motor irritation, which would have no such effect in a healthy condition of the spinal cord. The third is the most frequent state of convulsive cases. For instance, in children

who are teething, the irritation of the gums is not productive of convulsions in a majority of cases, but where from some other irritating cause, or from this continuing an unusual length of time, the spinal cord is brought into a peculiarly excitable state, the child may be thrown into them. The same thing is illustrated by the occurrence of convulsions from eating something that under ordinary conditions of the system might be taken with impunity. And it often happens that lancing the gums in the one case, and emptying the alimentary canal in the other, terminates the convulsions, showing that the *centric* irritation in the absence of an *eccentric* cause, is not sufficient to keep up the motor derangement.

In epilepsy, where universal clonic spasms come on suddenly, there can be no doubt that the pathological cause is in the cerebro-spinal motor tract. This form of convulsions may, it is true, be produced by great irritation exterior to the nervous centers, and in such cases will be relieved by measures that remove the local irritation; but when epilepsy becomes confirmed, it seems to be dependent upon some peculiar condition of the cerebro-spinal centers, of an exceedingly stubborn character. Some have located its pathological cause in the sensorium, from the obliteration of consciousness during the convulsive attacks, but it appears to me that this is only an effect of congestion and consequent cerebral pressure. Loss of consciousness, it is true, sometimes precedes the spasmodic tumult of the muscles, but in other cases the spasms commence in the body, and the cerebral functions become obliterated as the fit progresses.

Local spasms are frequently caused by reflected irritation, as where the legs are cramped in diarrhea, cholera, etc. The spasm of croup and whooping-cough is doubtless produced by reflex irritation. Local spasm may be readily produced at will by tickling the nostrils, when sneezing will follow, and the act of coughing from irritation of the larynx by the presence of the probang, often interferes with Dr. Green's method of treatment with that instrument.

Palpitation of the heart is a spasmodic action of that involuntary muscle, and may be caused by irritation in the stomach, intestines, kidneys, etc., and by the general irritation of the system existing during fever. All the involuntary muscular fibers are liable to spasmodic action, resulting from centric or reflex irritation.

When there is a general excess of reflex motor action throughout

the system, it must be referred to undue excitement of the entire cerebro-spinal motor tract, for where only particular portions of the spine are affected, the phenomena will be limited to parts that derive their motor influence from the affected portion; and reflected local irritation can only produce partial or local spasms, unless the spinal cord be brought, throughout its extent, into a state of irritation.

The *cause* of excessive susceptibility in the motor ganglia, as in other nervous affections, may exist in the state of the circulation, or in some peculiar modification of the vesicular nervous substance, that favors those vital changes which result in the generation of nerve force. An undue influx of blood, or the presence of a poison specifically irritating to nerve vesicles, may have this effect. The convulsions produced by strychnia can not be supposed to result from any local acceleration of the blood in the motor centers, but it appears to act upon the motor vesicular substance in a manner suggesting the idea of elective affinity between them.

There can be no doubt that protracted muscular inactivity is attended by an exaltation of the motor influence in the nervous centers. In this way we may explain the increase of reflex susceptibility in some paralytic cases, where the motor influence can not be exhausted by voluntary motion. This also explains why fits of epilepsy and of apoplexy are apt to occur during sleep.

Deficiency of involuntary excito-motor function is certainly present in paralysis of the involuntary muscles, as in paralysis of the stomach, intestines, bladder, etc. It also may be regarded as the cause of imperfect action of muscles that are only partially under the control of the will. Such deficiency renders the respiratory movements feeble, and may, if extreme, produce death by cessation of those movements. It may render deglutition impossible, and cause loss of voice by paralysis of the muscles of the glottis. Coma and narcotism evidently destroy life by depressing the reflex motor force by which alone the movements essential to life are sustained. This function is the last to fail in asphyxia, syncope and other states simulating death, and is the first to re-appear if the patient revive. Hence movements of the chest, sneezing, coughing, vomiting, etc., are among the first signs you will detect of re-action. Tremors of muscles, such as occur in extreme debility and in old age, and that sense of sinking sometimes experienced by sick persons, may be attributed in part to deficiency of the involuntary motor power. Debilitated persons are sometimes afraid to fall

asleep, because the automatic nerve force is insufficient to keep up efficient respiration, unless assisted by voluntary effort.

The therapeutic indications are similar to those mentioned for exaltation and deficiency of nervous functions generally, requiring merely to be varied so as to bring them to bear efficiently in the diversified forms of disease in which morbidity of the involuntary motor influence is present.

I desire, however, to say here what might have been said, perhaps, more properly at the commencement of nervous functional diseases, that I believe the profession generally have been too much accustomed to attribute the cause of nervous disorders to irregularities in the movements of the blood. That such irregularities are apt to occur in disturbance of the functional nervous centers I freely concede, and that they complicate and add to the gravity of the morbid condition is equally true, but that either accelerated motion or stasis of the blood is so frequently the prime cause of nervous disorder as writers generally seem to teach, is to my mind more than doubtful. Why should these irregularities occur in the blood-vessels? Do they originate in some modification of the heart's action? If so, then what causes such modification? But the heart is merely a central pumping organ, and according to the laws of hydraulics, its force must be exerted through the arteries in every direction alike, and until the condition either of the blood vessels or of the blood contained in them is changed, I can see no reason why an impulse of the heart should accelerate the circulation in the nervous centers more than in any other part of the system at an equal distance from it. Is it not much more probable that the change in the capillary circulation of the nervous centers is produced by the action or condition of the nerve-substance, and that it is, therefore, generally an effect and not a cause. Capillary circulation is rather the result of attraction than of impulse from behind (*Draper*), and it is easy to perceive how exalted nervous activity may increase, and nervous depression cause retardation of the blood's movements in the capillaries of the part where such changes occur.

I am convinced, from every view I have been able to obtain of the subject and by my own experience in practice, that depletory measures of any kind are seldom demanded in excitement of the nervous system, and that general blood-letting is never proper; and I am pleased to find the opinion sustained by very respectable authority. "You may more readily bleed a man into apoplexy

than bleed him out of it," said a reputable old-school professor recently in my hearing. The statement is true, and applies with equal force to almost every form of disease in the nervous centers, and is especially true in regard to excitement of the reflex actions. The muscular contractions of the animal you bleed to death are but reflex actions produced by the measure. So also the cramps in cholera are reflex actions caused by the depletion of watery diarrhea.

Reflected Sensibility.—Irritation in one part is not unfrequently denoted by pain or increased sensibility in another. Thus, irritation of the liver causes pain in the right shoulder, and disease of the stomach is not unfrequently attended with pain in the left. Disease of the uterus is frequently the cause of pain and tenderness of the spine and of irritation and pain in the mammæ. In fact spinal irritation is generally attributable to disease of some organ, the neurological relations of which correspond to the part of the spinal column where the irritation exists, and though caused by disease of an internal organ which may have been cured, the spinal irritation may remain during an indefinite period and be the seat of much suffering, or a center from which painful sensations will radiate to the organ originally diseased, or to other parts in relation by nervous communication with that portion of the spinal cord.

Moderate counter irritation, followed by suitable soothing treatment to the spine, and depuration of the blood and invigoration of the system by means of eliminating and restorative medicines, nourishing food and moderate exercise, constitute the best method of permanently relieving such cases. If the reflected sensations depend upon existing disease in some organ more or less remote, that disease should of course be removed, and such treatment at the same time applied to the spine as will prevent a fixed irritation from seating itself there.

LECTURE VI.

GENERAL PATHOLOGY—CONTINUED.

Functional Disease Continued: Disease of Secretion; General Observations on the Function of Secretion; Nutrition; Assimilation; Secretion Proper; Recrementitious, Excrementitious; Excessive Secretion; Deficient Secretion; Perverted Secretion; Recapitulation.

DISEASE OF SECRETION.

General Observations on the Function of Secretion.—The term “secretion,” simply means separation, and is properly applied to any process which draws from the blood any of its elements, or any substance that may happen to be present in it. The vital process of secretion, however, differs essentially from that of exosmose or mere filtering, by which fluids escape from the vessels that contain them. It is a vital action every way analogous to that of cell development, by which the various tissues of the body are originally produced. It is, in fact, carried on by the development of cells, that draw from the blood the materials of the secretion it is their office to produce.

The purposes for which secretion is performed, using the term in its broadest sense, are: 1, To furnish materials for the growth and repair of the tissues; 2, To elaborate the circulating fluid and prepare it for the purposes of the economy; 3, To furnish fluids designed for some temporary purpose, outside of the circulation, and to be subsequently returned to it, in whole or in part, by re-absorption; and, 4, To depurate the blood by removing from it substances which can not be retained in it consistently with health.

The physiological action, by which the function is performed in every case, is identical, namely, the development and vital action of minute living cells, the main differences consisting in the character of the matter secreted, and its destination. The substances designed for the growth and repair of tissues are secreted from the capillaries of the tissues themselves, and become transformed into similar tissue. The process by which this separation is effected is

called *Nutrition*. The process by which the blood is elaborated, is performed in the floating cells of the chyle, lymph and blood, in the mesenteric and other lymphatic glands, and such glands as have no excretory duct, as the supra-renal capsules, thyroid, thymus and spleen, and also in the liver. This process is called *Assimilation*, and consists in the temporary separation of nutrient matters from the circulating fluid, modifying it by vital action, and returning it again to the blood. These two functions may be passed by without further notice at the present time, for diseased nutrition can be more advantageously presented in connection with structural disease, and the effects on the blood of imperfect assimilation, were sufficiently noticed in speaking of morbid states of that fluid.

The products of *Secretion proper* then, may be divided into two classes, the *Recrementitious*, or those which are designed for further use in the system, and the *Excrementitious*, or those that are to pass at once out of the body. It is, therefore, easy to see at a glance that morbid secretion is capable of exerting a vast influence in the system. Like the other vital actions secretion may be morbidly increased, morbidly diminished, or perverted.

Excessive Secretion is debilitating in its effects, in proportion to the amount of nutritive material it draws from the blood. If more of the normal elements of the plasma are withdrawn than are requisite to secure healthy digestion, the excess is wasted, and the blood is impoverished to that amount. But mere impoverishment is not all the evil that may result to the blood from excessive secretion. Each secreting organ selects particular elements and draws more largely upon them than upon others, and consequently an excessive action of this kind not only robs the blood but destroys its equilibrium. Nitrogen is an important element in the composition of the blood, and excessive secretion of urine draws largely upon this element, and the result must be a comparative preponderance of hydrogen and carbon in the circulation. On the other hand, excessive secretion of bile, which is rich in both hydrogen and carbon, leaves in the blood an excess of nitrogen. In order that the blood may be maintained in its normal constitution, these two secretions should balance each other, for, according to the analysis of Liebig, the chemical constituents of the two secretions taken together make up those of the blood. The solid constituents of urine are rich in nitrogen, while those of the bile are largely composed of hydrogen and carbon. It is evident, therefore,

that excess of one of these secretions without corresponding increase of the other, must soon materially change the constitution of the blood. This consideration satisfactorily explains certain phenomena generally observable in connection with excessive biliary secretion. Such excess, if not attended, or very soon followed by increased activity of the kidneys, is very apt to be succeeded by fever, and that fever to terminate in coincidence with a large flow of urine. These examples of the two principal *excretions* of the body, sufficiently illustrate the tendency of excessive secretion to derange the blood, and the manner in which such derangement is produced.

But excessive secretion by any organ, diminishes the functional power of that organ, and is generally followed by a torpor proportionate in some degree to the previous exaltation, or if still stimulated to activity, its secretion presents qualities different from those of health, or in other words, becomes *perverted*. This is an important pathological fact, and should never be overlooked by the practitioner, in his efforts to relieve the system by exciting the secreting organs to activity. Excessive functional activity may furthermore produce such changes in the circulation and tissues of the organ as to result in structural disease.

But, in addition to the retro-active influence of excessive secretion on the blood, and the derangement it may cause in the secreting organ, other injurious consequences are likely to follow. The fluid secreted in excess may do harm in the channels through which it passes. Too much bile, though normal in quality, interferes with chylification, and hurries off the alimentary matters that enter the small intestines by way of a bilious diarrhea; and as the secretion is apt to be or to become more than ordinarily irritating under such circumstances, its passage through the alimentary canal produces irritation of the mucous membrane, and muscular coat, and is generally attended with more or less griping pain, and may cause vomiting, cramp, tenesmus, inflammation and hemorrhage.

The *cause* of excessive secretion has generally been referred to the quantity and quality of blood with which the organ concerned is supplied, and without doubt this has much to do in producing the morbid activity. But notwithstanding some very eminent pathologists have expressed a contrary opinion, I must insist that the condition of the nervous system should also be taken very prominently into the account, in explaining morbid exaltation of the secretory function. I suppose indeed that the vital properties

of all the tissues entering into the structure of a gland are morbidly affected in the form of disease we are now considering. The irritability, tonicity and nervous endowments of the organ are without doubt more or less altered; and this morbid condition may, as I believe, have its origin in some peculiarity in the quality of the blood, but not in its quantity. If healthy blood accumulates in any secreting organ or circulates through it with undue rapidity, the cause is to be sought for outside of the blood itself. Healthy blood never moves too fast, never stagnates, in perfectly healthy capillaries.

To what cause then shall we look for those cases of excessive secretion which certainly do occasionally occur without any previous morbid change in the blood. If the excito-secretory system of nerves be a reality, and I have no doubt of it, there is no more difficulty in accounting for exaltation of the secretory function than for excessive sensibility or motor action. Irritation in any of Dr. Marshall Hall's nervous arcs may, it seems to me, very naturally excite undue function in any secreting organ to which the centrifugal fibers of that arc are distributed; and as the sympathetic ganglia are concerned in the transmission of the excito-secretory influence through the centrifugal sympathetic nerve-fibers, it is highly probable that irritation in those ganglia is very often the pathological origin of the excitement manifested in the secretory function. In this case the irritation might be denominated a *centric* cause; where the irritation is transmitted first to the sympathetic ganglia and thence to the secreting organs it might be termed a *reflex nervous* cause, and when the irritation originates in the secreting structure itself, from impurity of the blood, it might be designated as a *vascular* cause of the excessive secretory action.

I would not, however, have you understand me to deny that in either case the morbid action is not attended by an increased circulation of blood in the part, for the old maxim, "*ubi stimulus ibi fluxus*," applies with peculiar force to every case of this kind; I only express confidently the opinion that the determination of blood is not the prime cause of the glandular irritation, though it may tend to increase it; but that the true cause is to be found either in the *quality* of the blood or the character of the nervous influence exerted upon the secreting organ. Even excessive mental emotion is a frequent cause of excessive secretion by the kidneys, by the liver, by the skin, and by the mucous membrane of the alimentary canal. A friend of mine, a lawyer, told me that during the pro-

gress of the first suit in which he was engaged, and especially as the time approached for him to address the jury, he had such an inordinate action of the kidneys that he was compelled to leave the court-room every few minutes for the purpose of micturition, and this is by no means a rare instance. Every one knows that mental anxiety and agitation often produces excessive sweating, and sometimes bilious, at other times watery diarrhea, and that the mere thought of palatable food will excite a flow of saliva. These familiar facts demonstrate the connection of nervous influence with the function of secretion.

In regard to *therapeutic measures*, it may be remarked that such are generally found to be serviceable as are employed with a view to the principles just advanced. In many cases no remedy is required, for the excessive secretion will soon abate the exciting cause, care being taken to prevent the excitement from becoming extreme. In some cases, and perhaps in most, a very mild remedy that specifically promotes the secretion abbreviates the morbid action by hastening the removal of the exciting cause. Revulsive measures, directing vascular and nervous determination to another part; soothing, aperient treatment of the bowels, and arterial and nervous sedatives have their appropriate places in most cases of any duration or gravity. In some cases tonics, astringents and even stimulants are the most successful means that can be employed, especially where the derangement is co-existent with debility, as in colliquative diarrhea, night-sweats, leucorrhœa, etc.

Where excess in one secretion is followed by febrile re-action, or by nervous irritation or depression, it is often important to excite some other secretion that will relieve the blood of the elements that have acquired a preponderance in that fluid in consequence of the obstruction of others. Thus, in bilious diarrhea, diuretics and diaphoretics, and in over-action of the kidneys a gentle cholagogue will generally fulfill the leading indications.

Deficiency of secretory function is a morbid state as important in its pathological relations as excess. Partial or complete cessation of any secretion is evidence of morbidity as its cause, and is followed by more or less disturbance as its result. Among the evils consequent upon deficient secretion, is the influence exerted upon the blood; but this depends very much upon the character of the secretion. Deficiency of recrementitious secretions does not tend directly to derange the constitution of the blood, because they

merely draw from it a portion of its nutrient elements. The effect, therefore, of an arrest of such secretions, is to leave in the circulation substances that may not only be safely retained, but may be appropriated to the growth or repair of the tissues. But failure in any one of the excretions leaves in the blood-vessels the characteristic elements of that excretion, which require to be regularly voided from the system, and an accumulation of which materially changes the quality of the blood. And it is no matter, in this regard, whether the constituents of the excrementitious fluid are pre-formed in the blood or are compounded in the secreting cells; for the elements of which they are formed are as truly excrementitious as would those constituents be if they existed ready formed in the blood; and it is asserted that in some instances they are more harmful. The re-absorption of bile appears, in fact, to produce less injury than an arrest of the secretion (*Budd.*)

The injurious matters that are removed from the system by excretion are derived from two sources, the waste of the tissues, and superfluous alimentation. They are not, however, in all cases, passed immediately from the system by the organ that first abstracts them from the blood, but are in some instances passed from one organ to another, being modified by each, and thus find their way out of the system by a circuitous route. Thus, it is now well established that the liver performs the triple secretory function of forming sugar, fat and bile, the first two being subservient to respiration, and excreted from the lungs in the form of water and carbonic acid. A portion of the bile, which is thrown into the alimentary canal, passes off with the feces, but the greater portion is re-absorbed, oxidated and eliminated, the hydro-carbon by the lungs and the sulphur by the kidneys.

It is plain, then, that deficiency of function in the excretory organs not only causes derangement and poisoning of the blood, by leaving effete and superfluous matters to accumulate in the blood-vessels, but that it may seriously embarrass other organs, to the functions of which its action is preparatory. Some of the excretory organs appear to be capable, in a measure, of exercising a kind of vicarious office when other organs fail in their depuratory action. Thus the coloring matter and some other elements of bile may be voided by the kidneys during torpor of the liver; and the skin not unfrequently performs a portion of the duties belonging to the kidneys when the renal secretion is deficient, and *vice*

versa; but if this state of things continue long, the organ upon which extra duty is thus devolved becomes weakened or otherwise diseased.

Some of the secretions being designed principally to moisten the parts over which they flow, their diminution merely causes dryness of such parts, as the lachrymal and salivary, though the latter also contributes to the solution of the food. Deficient secretion of gastric juice prevents digestion from being duly commenced in the stomach, and failure of the pancreatic and biliary fluids interrupts its completion in the intestines. In this way dyspepsia, flatulency, colic, diarrhea, costiveness, etc., may originate. Deficiency of function in the glandulæ of the alimentary tract, leaves uneliminated from the blood certain noxious excrementitious matters that should appear in the alvine discharges, and upon which their fecal odor depends. Much constitutional injury is often sustained in this way. In fact many constitutional affections have, as one of their most important elements, the deficiency of secretion in one or more important emunctories, as the liver, kidneys, skin or mucous membranes; but it would transcend the limits to which I must confine myself to go into any minutiae in naming illustrations of the fact. If I have succeeded in clearly establishing the extensive influence of deficient secretion as an element in disease, so that you will be on the alert in detecting its existence and in seeking to correct it in your treatment, I shall have accomplished all I proposed in this relation.

In regard to the organ in which the deficiency of function occurs, it seems almost unnecessary to say, that while it fails in its duty to the blood and to other organs, it also suffers from its own functional inactivity. It fails to relieve its capillaries from their engorgement, and although congestion may not have been the cause, as it often is, of the failure of secretion, it is very apt to come on as an effect.

The *causes* that may produce deficiency in the secretory functions are numerous. General debility in the circulation, or the presence of narcotic and other poisons in the blood, may depress the secretions generally, or they may be checked by exposure to cold, and by the tension of the system characteristic of the hot stage of fever. Local anæmia, congestion or inflammation of a secreting organ is likely to be at once attended by diminution if not arrest of the function. The condition of the nervous system has also much to do with deficiency in the secretory actions, and it

is by depressing the nervous forces, probably, that opium and some other narcotics so promptly arrest some of the secretions.

The therapeutic indications require the removal of all depressing causes, equalizing the circulation, quickening the nervous sensibilities, and the administration of such medicines as specially tend to excite action in the faulty organs, as cholagogues for the liver, diuretics for the kidneys, diaphoretics for the skin, laxatives for the bowels, etc. The blood in general anæmia should be improved by appropriate medicines, diet and exercise. Congestion and inflammation of the affected organ should be relieved by revulsion and antiphlogistic remedies.

I would caution you, however, against one course which has too generally prevailed in medical practice; I mean the exhibition of too potent agents in efforts to arouse torpid secretory organs. You may, by such means, temporarily attain your object, but your remedy may leave your patient in worse condition than it found him. A debilitated organ when excited to action by a specific stimulus, may very readily run into the opposite condition of excessive activity, and very soon exhaust its vital powers and sink back into a state of greater torpor than before; or under such circumstances organic disease may set in, and what was before merely a functional debility may result in a structural lesion. Such is no doubt frequently the case where mercury is employed to arouse the action of the liver, drastic purgatives for constipation of the bowels, and highly stimulating diuretics for torpor of the kidneys. Great care and sound judgment is required in all departments of medical practice, but especially in the administration of medicines that act specifically upon already debilitated organs. Remedies should be selected in such cases as act with gentleness, soon pass out of the system, and leave no further impression than that of exciting the functions to physiological activity; and these should be administered in such doses as will enable you to determine the extent to which the secretion shall be quickened. It is well also to accompany these specific remedies, or speedily follow them with such supportant treatment as shall impart vigor to the system, and enable the debilitated organs to sustain the activity to which you have urged them.

Atversion of the Secretions is a subject too extensive to be discussed with any advantage in this part of our course. Every secretion has its own characteristic physical and chemical peculiarities, and every one is liable to be essentially modified by disease in either

or both respects. A few general remarks upon it must, therefore, suffice, until the alterations of the several secretions shall demand our attention, when we come to describe diseases of the individual organs.

The products of secretion may be perverted, whether in excess or deficiency. The bile is not only in excess in bilious diarrhea, but is often exceedingly acrid, and irritating to the bowels, as well as much altered in color; while in some forms of fever it is very deficient, and yet what is produced, either with or without medicine, is highly depraved. Fevers are generally attended by deficiency, and alteration of the secretions of the kidneys and alimentary canal.

The urine affords the best illustration of perverted secretion of any other fluid. It is easily obtained, unmixed with other secretions, and readily analyzed. It is almost always more or less altered in its chemical composition by disease, and its morbid peculiarities may consist in the increase or diminution of one or more of its normal constituents, or in the presence of one or more ingredients not found in healthy urine. It is also subject to variations in color, opacity, density, etc.

Secretions that are designed to subserve particular purposes, are often so much altered as to lose their useful character, and even derange the processes which they should subserve. Mucus may be so viscid as to clog up the air tubes and other passages, or so acrid as to excoriate instead of protecting the parts over which it flows. The gastric juice is often vitiated, giving rise to dyspepsia; and perversion of the pancreatic secretion, by preventing absorption of the oleaginous elements of food, is probably a frequent cause of emaciation, and, as claimed by some writers, of tuberculosis.

The *Therapeutic indications* for perverted secretion vary, of course, with each organ that may be affected, and also with the peculiar condition of the whole system, and of the organ immediately concerned. The only general rule that can be given is one of a very indefinite kind. If fever, inflammation, congestion, or nervous disturbance cause the morbid state of the secretion, those causes are to be treated by appropriate measures. If the perversion partake of the character of either excess or deficiency, treat it generally as you would if no perversion were present. It is of course proper to protect the system, as far as possible, from the morbid effects of the vitiated fluid, by hastening its removal from the

body. The skin should be kept clean, and the bowels and bladder empty.

Recapitulation.—We have now considered consecutively those elementary departures from health which lie at the bottom of all the diversified phenomena of disease. Much more might have been said on each particular subject, had time and circumstances permitted; but as my object has been to isolate each element, and thus enable you to detect it among the complicated symptoms of disease, as encountered in clinical practice, rather than to discuss the philosophy of these primary morbid affections, I doubt whether that object would have been better attained by a more prolix effort at description.

A question may arise in your minds whether all the elements of functional disease are embraced in the arrangement by which I have been guided in my lectures on this subject. Let us recapitulate that arrangement. We have considered morbid states of the blood; changes resulting from mechanical and chemical causes; modifications of vital properties, diseased irritability of muscular fiber, diseased tonicity of the contractile tissues; diseased conditions of the nervous functions, as sensibility, voluntary motor action, and reflex motor action and sympathy; and, finally, diseases of secretion, which, in its widest sense, embraces all the vital functions by which the living system grows, and sustains the purity of its fluids, and the integrity of its tissues. Now, I do not conceive of any elementary morbid change that can occur in the human system, that may not be referred to some one of the principles just enumerated—abnormality of the blood, or excess, deficiency, or perversion of one of the vital functions. Of course I now speak of diseases of function, for the elements of structural lesions are to be presented hereafter. I think, then, we are now prepared to pass to the consideration of the proximate elements of disease; but, as the hour is nearly closed, we will take up that subject to-morrow.

LECTURE VII.

GENERAL PATHOLOGY—CONTINUED.

Functional Disease, Continued: Proximate Elements of Disease, Explanatory Remarks; Anæmia, Definition and Synonyms; General Anæmia, Condition of the Blood, Autopsy, Causes, Consequences; Local Anæmia; Hyperæmia, Definition; General Hyperæmia, or Plethora; Sthenic Plethora; Asthenic Plethora.

PROXIMATE ELEMENTS OF DISEASE.

Explanatory Remarks.—We proceed now to the consideration of more complicated morbid states, into which the elementary diseases we have been hitherto examining enter as components. Some of these, you will perceive as we proceed, are of sufficient gravity in their extreme manifestations to be considered maladies by themselves, and treated accordingly; but when studied as the subjects of General Pathology, they are to be contemplated as morbid states of the system, predisposing it to particular diseases, and modifying the character and course of all forms of disease with which it may be attacked. In this sense they are regarded as *proximate elements* of disease.

The condition of the circulation has always been looked to as one of the most important indices to the state of the constitution; and very properly; for the blood, and the vessels in which it flows, are more or less affected by every morbid change that occurs in the body, and are concerned in the discharge of every vital function, in health and in disease. Every combination of two or more elementary morbid conditions involves, in some way, a modification of the circulation, either in regard to the quantity or quality of the blood itself, or the condition of the blood-vessels; and, consequently, those morbid affections which pathologists have generally recognized as *proximate elements*, are referred to some peculiar condition of the circulatory system. These may be conveniently studied, as usual, under the two general heads of *Anæmia* and *Hyperæmia*.

ANÆMIA.

Definition and Synonyms.—Anæmia signifies want of blood, and is applied to a condition of the system in which the circulating fluid is deficient. It is not, however, to be restricted, by any means, to deficiency of quantity in that fluid, for the blood-vessels in this condition *may* be unnaturally full; but is to be understood rather as indicating an impoverished state of the blood. Hence, the term *Spanæmia* (poor blood) has been proposed as a substitute for the name usually applied to this state. *Hypæmia* and *Oligæmia* are also used by some authors as synonymous with *Anæmia*.

General Anæmia.—A brief rehearsal of the symptoms characteristic of Anæmia will be sufficient. They are muscular debility; weakness of the circulation, as evinced by feebleness and irregularity of the heart's movements, and coldness and pallor of the skin; loss of appetite; indigestion; torpor of the bowels, and general scantiness and disorder in the secretions. The deficiency of blood is demonstrated by the want of color in the cheeks, and even in the lips, gums, and tongue. The large superficial veins may be full, but instead of a deep blue, they are apt to present a pinkish tint, from the watery and transparent character of the blood. Venous murmurs—"the humming-top sounds"—may be heard in the jugulars, and a "bellows murmur" at the aortic orifice of the heart, and more distinctly in the large arteries of the neck. This latter sound is owing to the rapidity with which the thin blood is driven from the heart, by its morbidly abrupt contractions, into the diminished caliber of the arterial trunks. It is said by Andral never to occur except when there is deficiency of the red corpuscles, and may frequently be heard in the commencement of anæmia, before its characteristic rational symptoms manifest themselves.

Condition of the Blood.—The leading characteristic of the blood, in anæmia, is deficiency of red corpuscles, which accounts for its thinness and transparency, and for the remarkable pallor of extremely anæmic patients. Cases are reported in which the red corpuscles were as low as 27, while 40 to 60 parts in 1000 are by no means unfrequent proportions in this affection. But there is not so constant a diminution of fibrin; indeed, there is one form of anæmia in which the fibrin is little if any below the normal quantity. I speak now of Chlorosis, a disease in which the blood, when drawn, forms a small, firm coagulum, and presents the buffy coat. In scrofulous anæmia the corpuscles and fibrin are both reduced.

Autopsy, in cases where anæmia proves fatal, shows what would naturally be expected: an empty state of the vessels, or the presence in the veins of a scanty serous fluid, bearing but slight resemblance to healthy blood; a dryness of the flesh; effusion of serum in the serous cavities, and in the cellular tissue; a pale, flabby condition of the heart, with more or less dilatation; and a general unhealthy state of the organs, such as tubercles, enlargements, atrophy, and sometimes degeneration, in the form of softening, or carcinoma. Where structural affections of the lungs, liver, spleen, or kidneys are found, they should generally be regarded as the cause rather than the effect of anæmia.

The *causes* of anæmia which might be cited are exceedingly numerous. Deficiency and deterioration of the blood may arise, from, 1st, Its loss; 2d, From destruction of the red corpuscles within the blood-vessels; 3d, From failure or defect in the assimilative function; and, 4th, From want of proper supplies of nutriment through the organs of digestion.

1. Hemorrhage, whether produced by the lancet, by accident, or by disease, if profuse, or frequently repeated, rapidly induces a state of anæmia; the first effect being a reduction of the quantity of blood in the system, and the secondary result a relative deficiency of the red corpuscles, from the slowness with which they are developed, and the promptitude with which the vessels refill themselves, by the absorption of albuminous fluids and water. Excessive secretory waste, especially from the bowels and uterus, and the drainage kept up by continual purulent discharges from abscesses, etc., have a similar tendency.

2. The presence of poisonous substances, introduced into the body or produced within it during fevers and other diseased states, may cause destruction of the globules, and not only impoverish the blood, but render it highly depraved. (P. 58.)

3. Disease of the spleen, and of the supra-renal capsules, are specially spoken of as interrupting assimilation; but disease of any of the blood-vascular glands (*Kölliker*), and of the liver, which evidently has much to do with the development of the red blood-cells, can not fail to operate in the same way.

4. Dyspepsia, and all the causes that produce it; deficient supplies of food, or confinement to articles deficient in some of the necessary nutrient properties, must also diminish the blood in quantity and quality, and tend directly toward the production of anæmia. (P. 55.)

Persons of lymphatic temperament seem to be predisposed to anæmia, from a want of sufficient energy in the digestive and assimilative functions to replenish the blood sufficiently to meet the demands of nutrition.

Consequences of Anæmia. Although, as we have seen, anæmia is characterized by deficiency of healthy blood, by muscular weakness and general functional debility, still it affords no protection against fevers and other constitutional diseases, whether endemic, epidemic, or contagious. But when anæmic patients are attacked by any one of these, it is certain to assume the low, adynamic, asthenic, or as it is frequently termed, typhoid form. In this way anæmia becomes an important element in diseases generally. The state of anæmia may not exist at the commencement of a disease, but be superinduced during its progress, so that a malady that commenced in the sthenic may pass into the asthenic grade.

General anæmia is no protection against local hyperæmia, especially of the nervous centers. Hence, with a general deficiency of blood, and that general debility and torpor of function that naturally attends it, you are often presented with positive exaltation of the nervous functions. Indeed, anæmic persons are proverbially "nervous," generally exhibiting morbid sensibility, and more or less excitement of the motor functions. The habitual fidgety restlessness of persons in this condition, during their ordinary state of health, their liability to neuralgic affections, as headache, spinal tenderness, gastrodynia, etc., are doubtless owing to the tendency of the nervous centers to attract to themselves an undue proportion of the blood in the system, causing excitement and morbid exaltation of their functions; and the mental disturbance, low delirium, intolerance of light and sound, and subsultus tendinum of low febrile diseases, may be explained on the same principle. Chorea, hysteria, epilepsy, and coma, are affections to which anæmia constitutes a predisposition; all of which depend, in a great measure, upon the condition of the circulation in the nervous centers.

Anæmia, if long continued, is sometimes attended by grave derangements of the nutritive function, as manifested by ulceration of the cornea, falling of the hair, disease of the nails, softening of the bones in children, and fragility, exfoliation and necrosis in adults; sponginess and bleeding of the gums; emaciation and flabbiness of the muscles; tardiness of wounds and fractures to unite, and the spontaneous appearance of spreading ulcers, or of

ill-conditioned, sloughy sores upon the different parts of the body and extremities.

Loss of flesh is not, however, a necessary result, for cases occur in which there is considerable fatness and rotundity of person, associated with pallor of the surface, and other evidences of sanguineous deficiency.

Owing to the tenuity of the blood, and want of tonicity in the blood-vessels, dropsical effusions often occur in anæmia, especially under the disturbance of the circulation attendant upon inflammation, fever, or even cachexy.

Enough has now been said to give you a tolerably adequate conception of the nature of anæmia as a constituent of various diseases. For the treatment of the affection, I must ask you to wait until I come to consider specially those diseases that seem to depend upon deficiency and deterioration of the blood, as chlorosis, leucocythæmia, scorbutus, purpura, etc. I will, however, state, in general terms, that since the blood is nearly always impure in severe anæmia, depuration is generally required; since it is deficient in quantity and nutrient properties, wholesome, nourishing diet, within the powers of the digestive organs is always required, with so much exercise in the open air and light as imparts vigor to the system; and since the red corpuscles are especially deficient, iron in some form adapted to the condition of the stomach, should be prescribed. Some writers have recently recommended manganese as possessing the property of favoring corpuscular development and as a valuable accompaniment of iron. I have employed it to some extent, but have not met with such decided results as will enable me to express an opinion of its value. It deserves to be thoroughly tested.

Local Anæmia.—Without any deficiency of blood in the system at large, particular parts may, from various causes, be deprived of an adequate supply. In such a case we have an example of local anæmia, which will be attended by more or less local disease, in proportion to the degree and duration of the deprivation. Thus, pressure on the main artery, through which a limb is supplied with blood, soon causes numbness, weakness, and depression of temperature in the limb. Anæmia of the limb is produced, and the vital functions are depressed. Should such obstruction of the artery be continued, as it sometimes is in effect, as when an artery is required to be ligated, when an aneurism exists, or when the artery becomes obstructed by ossification of its wall and coagulation within it, and

the limb or other part not receive an adequate supply of blood through inosculating branches to maintain the vital properties of the tissues, the chemical affinities will obtain the preponderance and gangrene and death of the part must follow. It is said that atrophy, softening, and gangrene of internal organs, as the brain, spleen, kidneys, etc., sometimes results from the blocking up of arterial trunks leading to such organs, by fibrinous masses escaping from the heart in endocarditis, and other cardiac diseases, and being carried by the blood until they reach arteries through which they can not pass.

Local anæmia does not, however, necessarily involve death of the part, as it does not necessarily imply a complete obstruction of the blood. Persons in whom the action of the heart and arteries is weak, although they may not be positively anæmic, often experience local anæmia, as in the extremities, or in the capillaries of the skin generally, especially after bathing or when exposed to a slightly cold air. There are great differences among different individuals in regard to the distribution of the blood to the various organs. Some persons nearly always have a pale, dry, inactive skin, from an anæmic condition of the cutaneous capillaries, while they suffer perhaps most of the time from irritation of the bowels or some internal organs, from a tendency to internal determination.

The therapeutic requirements of local anæmia embrace all proper measures tending to equalize the circulation, and impart vigor and firmness to the system. Obstructions must, of course, be removed if practicable, and if not, such measures, as local stimulation and exercise, kept up as shall invite to the part an increased supply of blood, through whatever pervious vessels may enter it. Inosculating vessels, under such circumstances, generally enlarge, and, in many localities, attain at length sufficient size to supply the place of the main trunk.

HYPERÆMIA.

Definition.—*Hyperæmia*, or as it is called by some authors *Polyæmia*, means an excess of blood, and may be expressive of the condition of the entire circulation—*General Hyperæmia* or *Plethora*—and *Local Hyperæmia*,—which is called *determination of blood* when the movement of the fluid is increased, and *congestion* when the movement is diminished.

General Hyperæmia or *Plethora*.—This is a state of the blood and blood-vessels directly the opposite of anæmia, and as the latter

term does not imply merely a diminution of quantity, but more properly a deterioration or impoverished quality of the circulating fluid, so plethora is not restricted to a mere augmentation of the volume, but also implies an excess in the nutritive and stimulant constituents of the blood. It is not indeed necessary that the absolute quantity of blood in the vessels shall exceed the normal amount to constitute a state of plethora provided, there is a marked excess of the albumen, fibrin, and especially of the globules. Even in this last respect it is impossible to fix the precise boundary between a state every way consistent with comfort and safety, and one in which the circulating fluid is so abundant and so rich as to be incompatible with health. The blood in plethora, as was stated in a former lecture (page 55), is not diseased, in fact, or necessarily, and if disease occur, it is owing to the condition of the blood-vessels and other tissues rather than to the quantity or quality of the blood.

A correct definition of plethora, then, as the term should be employed, is this: "a state of the system in which the nutrient and stimulant constituents of the blood so far exceed the wants of the system as to embarrass the vital functions." If the system can, without embarrassment, perform its functions and appropriate the supplies presented for secretion and nutrition, though the red corpuscles are as high as 186 (page 56), no derangement will result necessarily, and such a state should not be considered morbid. On the other hand, though the red corpuscles were no more than 120, or even 100, and yet owing to the morbid excitability of the system, blood of that quality stimulated it to excessive functional activity amounting to disease, or produced a pressure upon the blood-vessels beyond their powers of endurance, involving hemorrhage or apoplexy, such a condition would amount to plethora.

Sthenic Plethora.—There are two conditions of the system in which plethora may exist, which are conveniently designated by the terms *sthenic* and *asthenic*. Where the vital properties of the heart and arteries are undiminished, the circulation in them of highly stimulating blood excites them to great activity. The pulse in such a state is full, strong, and accelerated; all the vital functions are performed in an energetic manner; the secretions are copious; the nervous sensibility high; the motor power great; the calorific function well sustained; and all the powers of body and mind fully developed. Now this surely does not constitute a state of disease. But if the process of sanguification still go on, and that more rapidly

than the wants of the system require, the blood becomes still more stimulating, the vital properties of the heart, arteries and capillaries become morbidly exalted, and a state of real disease may follow. The pulse now becomes hard, strong, and frequent, and the heat of the body morbidly increased; the capillaries are full of red blood, causing floridity of the complexion, redness of the lips, tongue, conjunctivæ, and the visible portions of the mucous membranes generally: the secreting organs are either excited to excessive action, or their capillaries so engorged as to endanger their safety. In this condition various morbid affections may arise, such as bilious diarrhea, hæmatemesis, gravel, strong acid urine, acute gout, depression of nervous functions from pressure of blood in the nervous centers, or headache, fullness and tension in the head, ringing in the ears, palpitations of the heart, and oppressed respiration.

Attacks of this kind are generally relieved by the excessive secretions that attend them, and the arrest of assimilation that takes place during the general derangement.

Sometimes the plethoric state does not reach so great a state of excitement and excessive functional activity as just described, though the condition may be well marked, and considerably beyond the bounds of health and comfort. The system may dispose of a portion of the excessive nutriment urged upon it, in deposits of fat, and this may eventually so burden the heart and arteries as to induce structural disease, such as hypertrophy, valvular derangement, aneurisms, etc. Such is a hasty description of sthenic plethora. It is the form of the affection usually presented in young persons, or individuals in the prime of life, in whom the digestive and assimilative functions are vigorous, but whose habits of living are not sufficiently active to produce such a waste of tissues as to require all the nutriment that is thus prepared and thrown into the circulation.

Asthenic plethora is characterized by want of susceptibility of the various tissues. The contractile fiber especially is deficient in irritability and tonicity. The excess of blood, instead of stimulating the heart and arteries to activity, merely overloads and oppresses them. The pulse is full and slow, or frequent and irregular, and there is often either palpitation, or else a tendency to faintness. In such cases there is a special tendency to dilatation of the heart, owing to its constant distension by a volume of blood which it is unable to expel. In this form of plethora the complexion, instead of being florid, generally presents a purplish color, owing to the

imperfect oxygenation of the blood. The veins are usually distended, and the sluggishness of the circulation, causes a tendency to coldness in the extremities. As you naturally would expect from such a state of the circulation, the vital functions are apt to be sluggish or unsettled; sometimes presenting unwonted activity under the stimulus of local irritation, though even then characterized by more or less perversion, at other times exceedingly torpid from depression of the nervous influences. The sensibility and motor power in such cases are usually in a low state, the mental faculties obtuse, the spirits depressed and there is a tendency to drowsiness and lethargy.

This form of plethora is generally a sequel to the sthenic, and is induced by impurity of the blood owing to deficient depuration; the effete substances left in the circulation depressing the vital properties of the blood-vessels, and thus reducing them to the state I have just described. Sthenic plethora is most likely to become asthenic when it occurs in aged persons, or those who have been weakened by disease or excesses. The assimilative powers of such persons may become very active, so as to produce an amount of blood beyond the wants of the system, and the imperfect action of the emunctories soon allows it to become loaded with effete matters and surplus nutriment.

The consequences resulting from this condition are various and a brief summary must suffice. They are congestions, passive hemorrhages, diarrhea, and dropsical effusions, and ultimately, if the condition continue long, structural changes as dilatation of the heart, as before stated, hypertrophy of the liver, varicose veins, etc. Owing to the tendency to congestion, this affection constitutes a strong predisposition to apoplexy and palsy, and where the cerebral disturbance falls short of these, there is apt to be headache, dizziness and mental torpor. Fever occurring in such a constitution is very likely to assume the congestive character.

In regard to the proper treatment of plethora there is great diversity of opinion in the profession. Those who deem general blood-letting a proper therapeutic measure in any case, are, however, pretty unanimous in recommendation of the lancet in this state of the system. This practice is based upon the fact that blood-letting rapidly reduces the red corpuscles, which being prominently in excess in general plethora are regarded as the enemy of health at which the physician should aim his weapons. If were true, the practice of opening the blood-vessels to

foe, would bear much plausibility however opposed to nature's method, and repugnant to the feelings of humanity, still its propriety could not be sustained unless it could be shown to be, 1, A safe measure; 2, Practically successful; 3, Preferable to other modes of treatment. Had I time to enter into the argument, and were this the proper place, I think it might readily be shown that phlebotomy is not sustained by either of the three considerations just stated, even in plethora, the only condition of the system that affords any pretext for its employment.

Although there is a preponderance of red blood-cells in plethora, there is no evidence that this fact is a ground of alarm, so long as the vital properties of the blood-vessels and of the nervous system remain unimpaired, and it is almost if not entirely certain that the mere excess of globules has no tendency to impair the vital properties. They may excite the organs to greater activity than would be otherwise exhibited by their capacity of conveying oxygen to the capillaries; but as they possess an equal capacity for conveying carbonic acid to the lungs, they do not tend to destroy the equilibrium of the system, provided the blood furnishes at the same time a sufficient amount of nutrient plasma to supply the waste occasioned by the functional activity. But I do not remember to have seen it claimed that general plethora tends directly to emaciation by wearing out the tissues more rapidly than they can be repaired. It seems merely to produce great vital activity throughout the system,—makes the individual “live fast”—unless some disturbing cause intervene to destroy the balance between the functions of nutrition and excretion. It is in this way, I venture to assert, that injury happens to plethoric patients, if at all. The dangers accompanying sthenic plethora, as claimed by the strongest advocates of bleeding, are “fevers, hemorrhages, fluxes and inflammations,” though Dr. Carpenter believes that “plethoric persons are not more prone to *inflammation* than those of weaker constitutions,” but “that they are liable to congestion of the brain, and to apoplexy or other hemorrhage.” He also states that bleeding diminishes this tendency by reducing the proportion of corpuscles. And yet anæmia is also attended by fevers, hemorrhages, inflammations, apoplexy and coma; and should we bleed in anæmia also? If it is replied that these affections in anæmia are passive, but active in plethora; I rejoin, that when an active hemorrhage or even congestion has taken place, blood-letting, if beneficial at all, can only be temporarily so; for reaction after bleeding is sure to re-establish

the congestion in the weakened part, even if the measure should be carried to fainting, unless other measures are promptly employed to reduce the excitability of the vascular system. Especially is this true of congestion of the nervous centers, whose situation within the cranium and spinal canal is such that they are affected by the loss of blood differently from other parts of the body. Now the very measures that will prevent the reaction after bleeding, will calm vascular excitement before, and the use of such measures as shall open the natural outlets of the system—the secretory organs—will reduce the sanguineous pressure as promptly and more permanently than the abstraction of a few ounces of blood from the arm; and will have this all-important advantage, that what is removed in this way from the blood-vessels is precisely that which produces the morbid state of the heart, arteries and capillaries in which the real danger lies. Bleeding at best is merely treating a symptom, but opening the secretions is striking at the root of the difficulty. (Page 56.)

LECTURE VIII.

GENERAL PATHOLOGY—CONTINUED.

Local Hyperæmia; Definition, Division of Subject; Determination of Blood or active Congestion; Physiological Determination; Morbid Determination; Caused by Stimuli;—Microscopic Appearances; Suggested distinction between Determination and Active Congestion; Determination from Intropulsion; Nature of Active Congestion; Its symptoms in the part affected, In other parts; Duration and Results; Determination to the Brain—Lungs—Liver; Therapeutic Suggestions.

LOCAL HYPERÆMIA.

Definition, etc.—Whether the volume of blood in the system is normal, excessive or deficient in amount, various causes may operate to produce an unequal distribution of it among the various organs of the body. We have already considered the causes, symptoms and effects of such unequal distribution where the blood is deficient in an organ or part, under the head of local anæmia (page III), and now our attention will be given to local accumulations of the circulating fluid, constituting what is styled *Local Hyperæmia*. There are two conditions in which an excess of blood may be present in a part, namely; 1, Where the motion of the blood is increased. 2, Where the motion of the blood is diminished. The first of these conditions constitutes “Determination of Blood” (Williams) or “Active Congestion” (Wood), the second, “Congestion” proper (Williams) or “Passive Congestion” (Wood).

DETERMINATION OF BLOOD OR ACTIVE CONGESTION.

Physiological Determination.—To comprehend fully the nature of this form of Hyperæmia, it is well to consider briefly instances of its occurrence in that moderate degree which is consistent with health, and even required in the normal discharge of the vital functions. Whenever any organ is engaged in the active perform-

ance of its functions, it attracts to itself, at the expense of other organs which are not so engaged, an increased amount of the circulating fluid, which passes rapidly through its capillaries, affording the organ such stimulus and material as are requisite to the fulfillment of its functional duty. This attraction in a state of health has, without doubt, its origin in nervous influence, produced in a manner which I must leave for physiologists to explain. May it not be that the attraction of blood to a part, under this nervous influence, is owing to a change in the electrical condition of the molecules of the tissues, disposing them to form those combinations with the sanguineous elements which physiological chemistry shows must take place within the body, but the *modus operandi* of which it is so difficult to explain or comprehend?

I have just said that this attraction of blood to aid in functional action is produced by nervous influence. This is evidently true in the case of muscular contraction, and is almost equally so in all cases where function is performed under mental impulse, as in the action of the cerebral organs during the exercise of thinking or the experience of emotion and of sensation. It is this that causes determination of blood to the brain during mental activity and its diffusion in the capillaries of the cheeks in blushing. But what causes the increased circulation in the mucous membrane of the stomach during digestion, in a gland when its secretion is being actively performed, in the uterus during the menstrual period, in the penis under the sexual impulse, and in any part when a stimulus is applied to it. Most certainly nervous influence exerted upon the capillaries of the part, which though obscure, is rendered much more intelligible than it has been heretofore, by the establishment of the excito-secretory sub-system of nerves, which controls the vital activity of the capillaries.

Having said thus much on what I will take the liberty of calling *physiological determination* of blood, it is certainly not difficult to conceive of an increase of nervous influence in any organ exceeding the mere function-exciting measure, and producing determination of blood beyond the demands of healthy action, or in other words constituting morbid hyperæmia.

The most frequent cases of *morbid determination of blood* are caused by the action of stimuli. The stimulus may be applied directly to the part, as heat, mustard, capsicum, or liquor ammoniæ to the skin; dust, smoke or a strong collyrium to the eye; snuff, or an irritating gas, vapor, or fluid to the nose; food, drinks, or

medicine to the stomach, etc. But they may also reach the part upon which they act indirectly through the circulation, and in this way hyperæmia of the nervous centers, glands, and other internal organs is in fact generally produced. A predisposition to hyperæmia often exists in a part owing to previous disease or some peculiar influence that has caused an excessive excitability, which results in inordinate action under even an ordinary or normal stimulant. Any thing, therefore, that increases the vital susceptibility of an organ is a predisposing— and any stimulant sufficient to excite the vital tissues, whether predisposed or not, to abnormal activity, is an exciting cause of determination of blood. A less potent stimulant is, of course, an adequate exciting cause where there is a predisposition than where there is none, and the predisposition may gradually increase to such a degree that no other excitant is required to induce determination.

Let us next inquire into the *pathological changes* that occur in the blood-vessels of the part affected during the existence of determination of blood. When the web of a frog's foot is touched by a gentle stimulant, as by a weak infusion of capsicum, we can perceive by means of the microscope, that there is a momentary retardation of the blood in the veins, and that the artery is distinctly diminished in size. This does not continue long, but in a few seconds the artery increases to beyond its former caliber, the blood in it, though momentarily retarded while dilatation is occurring, soon flows with a motion greater than before the stimulant was applied, and the capillary circulation is at once thrown into a state of unnatural activity. In some of the capillaries the red corpuscles pass in a rapidly moving throng, while in others which before were invisible, they pass in single file, being forced in some instances through tubes that do not appear to carry red blood in health, and which are still so small as to require an elongation of the corpuscles in their passage. The motion of the venous currents is also increased. There is, then, an enlargement of the final arteries and of the capillaries, so that an increased amount of blood is contained in the part, but there is also a more rapid movement of the blood through it. This is what I understand by determination of blood. It evidently depends upon an increased attraction of the capillaries for the constituents of the blood, sufficient to overbalance their own tonicity and cause enlargement of their calibers, and of that of the arterial ramusculi that supply them. The excitement is doubtless propagated beyond the seat of capillary irritation along

the arterial branches, increasing their activity so that the propulsive as well as the attractive force exerted upon the blood is augmented. Up to this point I do not think it proper to regard the state of the circulation as that of congestion; especially where there is no impediment to the free escape of the blood from the part through the veins; and if it would not produce confusion I should feel disposed to make a subdivision of the subject here, calling the condition I have just described determination of blood, and applying the term "active congestion" to that which immediately follows, where the determination is continued until the vital contractility of the capillaries is exhausted and the current is sustained by arterial propulsion alone.

This commencement of determination occurring from the cause just considered, namely irritation produced by the application of a stimulant or by abnormal innervation, is evidently a physiological effort of the blood-vessels to support the function of the irritated part and preserve it from harm. If this effort is successful the excitement of the part will gradually subside, leaving no other pathological effect than a temporary state of weakness and functional torpor, corresponding to the degree of irritation. But where the capillaries have been exhausted of their vital properties by the intensity of the exciting cause or by long-continued distension; and the arterial excitement continues to such a degree as to force more blood into the capillaries than can be carried off by the veins, a state of true active congestion must ensue, subversive of function and threatening structural lesion. The blood under such circumstances moves slowly or stagnates, it becomes darker in color, its serum may escape by transuding the attenuated walls of the capillaries, or these may be ruptured and hemorrhage take place. Thus that action which commenced as a physiological response to nervous influence, terminates in a serious pathological lesion.

But determination of blood does not always depend upon an exciting cause operating at the point to which the blood is directed. It may result from causes operating in other parts of the system. The sudden application of cold to the surface may so constrict the cutaneous capillaries as to expel the blood from them, and then the full force of cardiac and arterial contraction, which is usually sustained by all parts of the body, is expended upon the capillaries of the internal viscera, and determination is produced by *intropulsion*. It will then of course be most prominently manifested in

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that organ, or set of organs, in which there is least ability to resist the increased pressure, and in which there is a consequent tendency to dilatation of the capillaries and small arteries. The center of circulation often suffers first from such causes, and palpitation of the heart, and sometimes dyspnœa is the consequence. Those organs that lie nearest the heart, other things being equal, are most likely to be the seat of the determination, as the lungs, brain, stomach, liver, spleen, etc., though debility of an organ constitutes a predisposition which is very sure to designate it as the one to suffer. It is upon this tendency of the blood to ebb and flow under morbid and therapeutic influences that the application of heat, cold, and revulsive measures generally, is principally based. It is an important principle in a practical point of view, and should always be borne in mind by the medical practitioner.

The *nature* of active congestion may be briefly stated. It can not be regarded as consisting merely of an excess of blood forced into the vessels of a part, but embraces the fact that those vessels themselves are in an abnormal state, which is either the exciting or predisposing cause of the determination of blood, and which governs the degree and duration of the engorgement. It commences in irritation of the capillaries, when the exciting cause is applied to the part where the congestion occurs. That irritation is soon followed by atony, not only of the capillaries but of the smaller arterial branches that supply them. This state of atony, or want of tonicity, is by no means inconsistent with excessive irritability and hyperneurosis. Page 76. Some authors, I know, speak of active dilatation of blood-vessels, as if they possessed the power of self-enlargement, by the exercise of the same vital properties by which they contract. This does not appear to me to bear the character of rational conjecture. The increased attraction of the irritated tissues for the elements of the blood, the diminished tonicity of the capillaries and adjacent small arteries, and the increased contractile activity of the larger arteries, are amply sufficient causes of the distension of the engorged vessels without resorting to the hypothesis of spontaneous dilatation. Where local determination of blood is produced by intropulsion, or general arterial excitement, it certainly can not be attributed to any thing else than passive dilatation of the capillaries of the part, owing to want of tonicity as a predisposing condition, and since the excessive influx of blood may excite the vital properties of the tissues, and active congestion be kept up by local irritation, the pathology

of the diseased condition does not differ from that in which the congestion originates in irritation of the part affected. We may conclude, then, that *active congestion depends upon atony of the capillaries and small arteries of the diseased locality, accompanied by arterial excitement*. Of course the pathological facts are to be our guide in treatment.

The *symptoms* of active local hyperæmia vary from those of slight temporary injection to the severest grade of irritation bordering on inflammation. The part affected is flushed with a bright red color, is warmer than in health, and more or less tumefied. There is felt in it a sense of fullness, weight, and oppression, and in some localities where muscular tissue is present, there may be spasm, as in the stomach and intestines. Moderate determination of blood merely exalts the functions, but positive engorgement deranges them, and if continued very long causes their perversion, diminution, or even suspension. These remarks apply to all the functions. Hence, cramping and spasmodic action of the muscles, disordered sensibility, both general and special, and mucous, biliary and urinary diseases are frequent attendants of active congestion. Even the nutritive function is modified by active hyperæmia, if long continued or frequently repeated; the part thus affected being liable to become hypertrophied. Absorption may be retarded, or at least unequal to the removal of the serous exudation from the distended vessels, and anasarca, or dropsy of the serous sacs may result.

Other parts of the system are apt to present an opposite condition, owing to an ebbing of the blood during its flow to the affected organ, even where the determination does not originate in intro-pulsion. Hence in active internal congestion there is generally pallor and coolness, if not positive chilliness of the surface, and especially of the extremities. On the other hand, during determination to the surface, as in the hot stage of sthenic fever, there is generally great visceral inactivity, as indicated by arrest of the organic functions.

The *duration* and *results* of active congestion are both exceedingly variable. It may terminate with the appearance of excessive secretion, the effusion of serum in the tissues of the part or into an adjacent cavity, or the occurrence of hemorrhage from rupture of the engorged capillaries; it may produce simple hypertrophy, as was before stated, or result in perversion of nutrition, especially in the glandular structures, as the spleen, liver and kidneys, in the form of albuminous deposits and consequent granular degeneration,

or it may terminate in that perversion of all the functions of the part which we call inflammation.

It may not be amiss to occupy a little time, after having thus considered the general characteristics of active congestion, in exemplifying the affection as it occurs in some of the most important organs. The liability to, and influence of, determination of blood, differs materially in different regions of the body, owing partly to peculiarity of texture and function, and partly to varieties in the distribution and mode of action of the circulatory vessels.

Determination of Blood to the Brain. Dr. Kellie (Edinburgh Medico-Chirurg. Trans. vol. 1), has attempted to establish the proposition that there can not be any variation of the quantity of blood in the cranium. Although the subsequent observations and experiments of Dr. Burrows (Med. Gaz. April and May, 1848), and of other physiologists since, have demonstrated the unsoundness of Dr. Kellie's views, yet it is undoubtedly true that the circulation of blood in such a closed cavity as the cranium is peculiar in some respects, tending directly to modify the symptoms attendant on vascular excitement in the brain and its meninges. As the cerebral substance is inclosed by a bony casement which does not admit of its enlargement, it must experience an amount of pressure from forcible engorgement of its blood-vessels, greater than would occur had it room to swell as other organs have. This pressure may be slightly varied by diminution of the serous fluid contained in the ventricles, arachnoid and subarachnoidean spaces, and also by more rapid escape of blood from the cranium, though this is in some measure prevented by the pressure which the increased influx of blood causes to be exerted on the cerebral sinuses and veins. Owing to this pressure these channels are so much diminished that the current of blood in them must be greatly accelerated, when there is an increased arterial influx, to save the brain from compression. Hence we always find any considerable determination of blood to the head attended more or less by the same symptoms that characterize passive congestion.

What has now been said will sufficiently explain the symptoms commonly observed in active congestion of the brain. In moderate determination of blood, the symptoms of simple irritation preponderate, as increased acuteness of sensation and perception, or derangement of those functions as evinced by vertigo, headache, and disordered vision, hearing, and common sensation, etc.; excessive activity or even perversion of the mental powers as in raving delir-

ium ; and exaltation of the voluntary motor powers as often exhibited by delirious and insane patients. But where the influx of blood is very great, whether caused by the attraction of internal irritation alone, or increased by arterial pressure, which is generally the case as shown by the throbbing of the carotids, the symptoms of compression are superinduced, and may greatly obscure those before mentioned. These are heaviness, lethargy, drowsiness, mental confusion, loss of memory, involuntary movements, as subsultus tendinum, convulsions (page 93), or loss of motor power causing paralysis. When we come to study passive congestion, it will be seen that many of the symptoms just enumerated are present in that condition also, being produced by the same cause—compression of the cerebral organs.

The lungs and liver are both subject to active congestion from two sources, one furnishing red or arterial and the other dark or venous blood. There can be no doubt that both these organs are subject to the same causes of determination of arterial blood as other parts of the system, and that such irritation as tends to induce active congestion from this source is certain to be accompanied by embarrassment of function and active engorgement of the capillary plexuses into which the venous blood is received. It is certain also, that obstruction to the transmission of blood through either of these organs from any cause, though it may at first constitute a case of passive congestion, is very often productive of an irritated condition that leads to active engorgement.

In the lungs especially, in addition to the attractive force exerted by the tissues in a state of irritation, the propulsive force of the right ventricle of the heart tends to force the blood into the pulmonary vessels and increase their distension, and this must continue with more or less force so long as any obstruction to the transmission of blood through the capillaries remains, or until the heart ceases to act, for there is no other route which the circulation can take from the right side of the heart to the left. And as failure of the respiratory function soon arrests the capillary circulation, and as the propulsive force of the right ventricle is comparatively feeble and ceases to be efficient whenever the pulmonary artery is full of blood which can not pass through the pulmonary capillaries, active congestion of the entire lungs is soon followed by passive congestion of the venous side of the general circulation, and without speedy relief the patient dies of asphyxia. It should be borne in mind, that in active congestion the pulmonary capillaries are

filled with venous blood, whereas the same disease in all other portions of the body (except the liver) is characterized by determination of arterial blood, and even here the irritation which gives rise to the attack probably makes its first impression on the nutrient capillaries of the bronchial circulation, producing an incipient congestion of the lining membrane of the air-passages and cells, and that this so far interferes with respiration as to prevent arterialization of the blood in the pulmonary capillaries. There is no doubt in my mind that asphyxia often thus has its origin, from the same pathological causes that produce simple active congestion in organs possessed of less complicated circulatory vessels. Owing to the venous character of the blood, and perhaps to the peculiar circumstances of its arrest, in active pulmonary congestion, it has little tendency to coagulate, which is an important fact in practice, for were this not the case, there could be little hope of restoring the movement of the blood through the lungs in cases of suspended animation from this cause.

But irritation here does not necessarily extend to both lungs, nor to all of one lung, and hence we may have, and often do have, active congestion of a circumscribed portion, which if general would speedily prove fatal, but which merely manifests itself in local effusion, perhaps hemorrhage, embarrassment of respiration, etc., and subsides, leaving no lesion behind that will not be speedily repaired; or passes on into the inflammatory state constituting pneumonia.

Active congestion of the liver is sustained alone or at least principally by the attraction of the irritated hepatic substance for the elements of the blood, which causes an unnaturally rapid flow to the organ through the hepatic artery and portal vein. It may, however, be produced in some degree by inordinate activity of the capillary circulation in other abdominal viscera, whereby the portal circulation is accelerated by a *vis a tergo*, impelling the blood with unwonted force to the liver. In moderate degree, congestion of the liver dependent on irritation of that organ, causes increased secretion of bile, or it would perhaps be more nearly correct to say, is caused by increased secretion, for the nervous irritation probably first displays itself in an exaltation of the secretory function, and to supply the demand thus produced, an increased influx of blood takes place. If, now, the hepatic veins are able to receive and discharge into the vena cava this increased flow of blood, no serious engorgement of the liver is likely to ensue. But when the irritation is continued very long, torpor of function is sure to occur

while the capillaries and portal veins are loaded with blood, and the hepatic artery, which has partaken of the excitement, throws an unusual amount of blood into the organ, keeping up a stimulating influence. In this way, congestion of the liver is often prolonged after the biliary secretion is perverted or suspended. The consequence is distension of the gland, modification of its structure, albuminous deposits, and granular or it may be fatty degeneration. The congestion may, however, result in hepatitis.

But I have already occupied too much time with this part of the subject, and will close what I have to say upon determination of blood and active congestion by a few *therapeutic suggestions*.

During the early stage of active hyperæmia, while the capillary circulation of the part is still vigorous, sedative treatment is indicated. Arterial and nervous sedatives may be exhibited internally if there is general excitement, and soothing fomentations or anodyne liniments over the seat of the irritation. The application of cold to the part sometimes acts like a charm when administered at this stage, from its effect in restoring tone to the capillaries. Revulsives also may be employed with a view to call the nervous and vascular excitement to some other locality. But after the vital powers of the small vessels have begun to flag and true congestion is established, a stimulating treatment must be combined with the anodyne and revulsive. You should not exhibit an arterial or diffusible stimulant, but one tending to stimulate and sustain the nervous centers, and thus strengthen the capillary circulation. Where the congestion is internal, an emetic may be of great service at any period, from its tendency to determine the circulation to the surface. But the vegetable stimulants, such as capsicum, piperin, xanthoxylum berries, serpentaria vir., and with them quinia or cinchonia, or other tonics, are clearly indicated from their tendency to invigorate the capillary circulation by quickening the excito-secretory nervous system. Local depletion by cups or leeches is often beneficial by assisting to relieve the distended vessels, but general blood-letting should not certainly be employed, because it can have very little beneficial effect on the local affection under any circumstances, and may do much constitutional injury. While it is acknowledged that anæmic persons are even more liable to local determinations of blood than those of full habit, I can not see with what reason we could hope to relieve such determinations by general bleeding.

It is not the quantity of blood, in the system, nor in the part

affected even, that constitutes the real disease in active congestion, but it is the morbid condition of the solids through which it circulates. This commences in irritation which extends to the arteries, and results in exhaustion—"depression"—of the congested vessels. The ~~main~~ indications then, are to allay irritation and impart tone ~~and vigor~~ to vessels that may have already become too much exhausted to sustain their functions.

But I must resist the tendency of mind which I experience to anticipate what belongs to special therapeutics and to descend to the minutiae of medical treatment. We will here dismiss the subject of active hyperæmia and take up, in the next lecture, passive congestion.

LECTURE IX.

GENERAL PATHOLOGY — CONTINUED.

Passive Congestion: General Remarks; Causes—1, Atony of Blood-Vessels, General, Local; 2, Venous Obstructions; Symptoms and Effects; Passive Congestion of the Brain, Stomach, Liver; Therapeutic Indications.—Inflammation—Note: Structural Diseases, or Diseases of Nutrition: General Observations; Increased Nutrition—Hypertrophy; Simple Hypertrophy; Complex Hypertrophy; Therapeutic Measures.

PASSIVE CONGESTION.

General Remarks.—This is the only form of local hyperæmia to which some writers apply the term congestion. There seems indeed to exist not a little confusion among the authorities on this subject, and there is some danger that the student will experience much perplexity in consulting different authors in regard to it. Dr. Williams in his work on the “Principles of Medicine,” defines congestion to be local hyperæmia “with motion diminished” and designates local hyperæmia “with motion increased” as “determination of blood.” I have heretofore intimated my approval in part of this distinction (pages 112, 121). I am satisfied however that there are two conditions in which the movements of the blood are diminished that differ widely from each other. One is that which we have just been considering; which I have, with Dr. Wood and others, designated as active congestion; which originates in irritation of the capillaries from either nervous excitement or intropulsion of blood; and which is increased by the augmented arterial action after the capillary circulation has become retarded from atony and exhaustion of the capillaries and small arteries. The other is that to which your attention will now be called, and which differs essentially from the former in its origin, character, and results.

Causes.—Passive Congestion may be caused by atony of the blood-vessels or by venous obstruction.

1. *Congestion from Atony of the Blood-Vessels.*—This condition may be general or limited to a particular part. In those depressed

states of the system, attendant on very prostrating diseases there is a great tendency to passive accumulations of blood. Here the heart partakes of the general depression, and being unable to propel the blood through the arteries as rapidly as it is received from the vena cava, the right side of the heart and the venous trunks that open into it become distended with blood. This of course soon produces accumulation of blood in the veins of the brain, liver and all other organs. Sudden concussions of the system, especially of the head; the influence of poisons that depress the nervous centers,—as malaria and malignant contagions; depressing emotions; and prostrating pain such as that caused by spasm of the stomach or bowels, produce congestions of the passive character by diminishing the power of the heart. In venous congestions from this cause the entire capillary circulation must of course be impeded, but the capillaries of the parenchymatous organs as the liver, spleen and other glands, being less endowed with tonic fibers, are generally more distended and become the chief seats of passive congestion. This accounts for the great tendency to congestion of the liver and spleen, especially in fevers attended with great prostration of the vital powers.

What is sometimes called *hypostatic* congestion is caused by general atony of the blood-vessels, in which condition there is a tendency to accumulation of blood in the lowest parts, when the body is kept in one position. Thus, where debilitated patients lie upon the back, there is apt to be congestion in the posterior portion of the lungs, bowels and integuments, and also in the cerebellum and spinal cord. The cause of this is the yielding of the weakened vessels beneath the weight of blood which they have not sufficient strength to sustain.

But there is often atony of the vessels in individual organs or associations of organs, while the vessels of the general system are in a normal condition. Such a state of local atony generally depends upon previous disease, or injury inflicted in some way upon the organs concerned. Over-distension of the capillaries from determination of blood or active congestion, very often leaves the part liable to passive congestion after the arterial excitement has passed off. Such a state of local debility may even be induced without previous active hyperæmia, from too long continuance in one position. Very long standing generally causes more or less swelling of the feet even in healthy persons, and very few individuals can remain long with the head much lower than the body

without experiencing symptoms of cerebral congestion, as giddiness, headache, dimness of sight, confusion in the ears, etc., and some persons are in danger of apoplexy whenever they stoop. This is not owing to determination of arterial blood to the head, but to retardation of the movement of the blood in the veins, owing to its specific gravity. Where an organ is debilitated from disease or any cause, it is important to caution the patient against remaining too long in a position that favors subsidence of the blood to it. After pneumonia the patient should not lie long at a time on the affected side, and after inflammation or active congestion of the brain, it is well to keep the head somewhat elevated and change it from one side to the other occasionally. The perpendicular position of the body too long maintained favors congestion of the womb in debilitated states of that organ, and hemorrhoids may be produced in the same way where there is a predisposition to that affection.

But the local vascular depression may be, and often is, so great that passive congestion occurs without the part being placed in a depending position, from the inability of the vessels to sustain the pressure of the circulating fluid in any position. The deficiency of tonicity causes the capillaries to become over-distended in ordinary states of the circulation, or at all events under some trivial impulse to which they are constantly liable, and this effect remains after the slight exciting cause has ceased. Thus, coughing, vomiting, lifting a weight, etc., may produce passive congestion of the brain in great debility of the cerebral blood-vessels, which will continue for some time after the impulse has ceased. I have often known persons who would complain of dizziness, fullness of the head or headache for hours after straining, to accomplish something requiring muscular effort, as in drawing on a boot, difficult defecation, etc. Exposure to changes of the atmosphere by checking the cutaneous capillary circulation, often causes passive congestion of the liver by temporarily retarding the transmission of blood through the heart and lungs, and if the hepatic capillaries are in a debilitated condition the congestion may persist long after the general movement of the blood is restored.

Similar illustrations might be given of congestion from vascular weakness in other portions of the system, but this part of the subject has I believe been sufficiently elucidated, and we will pass to the consideration of

2. *Congestion from Venous Obstruction.* Any thing that interrupts

enlargement of the spleen, hæmatemesis, intestinal hemorrhage, and hemorrhoids are very frequently produced. The pressure of the enlarged and indurated liver on the vena cava may cause congestion of the kidneys, organs of generation and the lower extremities. The gravid uterus very frequently interrupts the return of blood from the lower extremities by pressing on the iliac veins, causing swelling of the limbs and a varicose condition of the veins. It would be idle to illustrate this subject further.

Symptoms and Effects.—Passive congestion, whether caused by stony of the vessels or physical obstruction, may be attended with danger, and often causes serious derangement of function. The symptoms in the congested part are a sense of fullness, heaviness and oppression; a reduction of the temperature; a dark red color, essentially different from the brightly florid hue seen in active congestion; and diminution of the natural sensibility. If continued long there is apt to be dropsical effusion into the cellular tissue or into a serous cavity if a serous membrane be the seat of congestion. Watery diarrhea, diuresis, and a profuse clammy sweat, are often results of passive congestion of the tissues from which such discharges proceed. Passive hemorrhage is not an unfrequent effect of this form of sanguineous engorgement, the coloring matter as well as the serum of the blood transuding the walls of the debilitated blood-vessels. There is always more or less derangement of function, and there may be a total loss of vitality and consequent disorganization.

As has been before stated positive irritation may result from passive congestion. Obstruction of the hepatic veins preventing escape of blood from the liver, may produce a state of irritation in that gland sufficient to induce an increased determination of blood to it, and thus cause active congestion. Irritation of the bowels, accompanied by exhausting diarrhea or running into inflammation, may result from passive congestion of the chylipoietic veins, when the portal circulation is arrested in the liver. This result—irritation—is not likely to follow congestion from stony of the blood-vessels of the part immediately concerned, but is not an uncommon result of passive engorgement of vessels that retain their vital vigor.

The first effect of a passive congestion may be an exaltation of some of the vital manifestations. There may be tenderness, pain, spasm, increased secretion, etc., for a brief period after the occurrence of passive congestion, but if the engorgement continues

the natural effect is to impair the functions and depress the vital properties, and the symptoms of excitement are usually therefore only temporary, and may not be presented at all.

Let us now notice briefly a few of the symptoms of passive congestion in different organs of the body, thereby illustrating the general statements which have just been made.

Passive congestion of the brain is attended by general cerebral oppression and torpor. Where the congestion results from depression of the nervous functions, symptoms of such depression will of course precede those of compression. But when the congestion is caused by mechanical obstruction, symptoms of compression may be the first presented. If however the obstruction is only partial, so that the functions of the nervous centers continue to be performed, symptoms of functional depression will soon be superadded to those of compression. Briefly,—in any case of passive congestion of the brain we may expect to meet with a combination of the symptoms which would result from mere depression of function without congestion, and of those which would be produced by mere compression. The distension of the veins and sinuses by venous blood, not only compresses the cerebral substances but prevents the reception of the usual quantity of arterial blood, so necessary to the functional action of the brain as well as of other organs; and these considerations are sufficient to explain the combination of symptoms that such cases present.

The notable symptoms are a feeling of fullness and weight in the head, with a diminution of warmth, drowsiness or stupor, vertigo, faintness, confusion of the senses of sight and hearing, loss of memory, dull expression of countenance, lividity of the lips, nose, etc., nausea, embarrassed respiration, and a depressed condition of the general circulation.

Passive congestion of the stomach may be attended with spasm or gastralgia at first; but the characteristic symptoms are loss of appetite, persistent nausea, and, if very severe, hæmatemesis.

When the *liver* is affected in this way it becomes enlarged, its secretion is generally very much diminished and at the same time perverted; there may or may not be pain or tenderness in the right hypochondrium, but there is usually a sense of fullness and weight, and the pressure of the enlarged gland against the diaphragm interferes with and embarrasses respiration.

The *therapeutical indications* of passive congestion have distinct reference to the cause. We are not to aim merely at the removal

of blood from the engorged vessels, but to correct the condition that produces the congestion. In pure passive congestion from atony, stimulants, astringents and tonics internally, pressure on the part affected where practicable, and the external application of cold are the leading measures. Where the cause is mechanical obstruction, the impediment to free venous circulation should be removed. If both causes are combined, as where the blood gravitates because of debility of the blood-vessels, change of position, supporting the congested vessels with bandages, together with such treatment as will give vigor to the system at large and especially impart tone to the blood-vessels, are to be employed.

INFLAMMATION.

[NOTE. My course of lectures as delivered in the Eclectic College of Medicine embraces the general pathology of inflammation, and this would be the place for that subject to be introduced. But having promised Prof. Jones that his work should appear in the second edition with as little change of matter and arrangement as might be consistent with general correctness, and feeling that his decease, so far from canceling has rather enhanced the obligation of that promise, I have determined to omit my own lectures on inflammation, retain those of Prof. J. and let the subject occupy the same relative position assigned to it by himself in the arrangement of his course of lectures. The reader is therefore referred to Prof. J.'s lectures on inflammation, pages 472 to 538 of this volume, where he will find the subject very extensively discussed in Prof. J.'s peculiar style, with an occasional note by myself. S.]

STRUCTURAL DISEASES OR DISEASES OF NUTRITION.

Preliminary Observations.—Were I delivering a course of lectures on morbid anatomy, it would devolve upon me, under this head, to enter into all the details of structural disease presented by the different tissues of the body, under the diversified morbid influences to which they are liable. The object of the present part of the course being, however, to place before you the general principles upon which structural changes depend, it will only be necessary to describe the principal forms of structural disease with sufficient clearness to enable you to readily identify them; and this can be done while specifying the modifications of the nutritive function by which the alterations of structure are produced.

Modifications of the structures of the body from mechanical and

chemical causes were briefly considered in a previous lecture (page 64), and as these consist chiefly of such injuries as fall within the province of the surgeon, we will let what was then said suffice on the subject, and will under the present head confine our attention to such alterations of the tissues as are produced by disordered nutrition.

You will recollect that it was stated in a former lecture, pages 97-98, that secretion in its broadest sense embraces the function of *nutrition*, and that although diseased nutrition might have been treated of among the elements of functional disease, it could be more advantageously presented in connection with diseases of structure. I now propose to take up that subject and in as brief a manner as possible, consistent with perspicuity, give you an outline of our present knowledge in regard to the nature, causes and consequences of morbid nutrition.

It is scarcely necessary here to remark that nutrition is one of the most important functions of the vital economy. Upon its continuance depends the development of the organs during the period of growth, and by it are all the organs sustained in the exercise of their functions, which would soon wear them down if the waste incident to functional activity were not constantly repaired by the nutritive process. As I have heretofore said, the nutritive function embraces in reality those of digestion and assimilation, the former introducing new materials into the system, and the latter elaborating them into forms adapted to the ultimate purposes of nutrition, their removal from the blood-vessels and transformation into living tissue.

It is evident from what has been said that the function of which I am speaking is liable to derangement from a wide range of causes, affecting the materials necessary for its support, the transmission of those materials by the blood-vessels to the parts where they are required, and the vital processes of cell-development and transformation after such materials have reached their destination.

In my general remarks on functional disease (page 69), all the modifications of the vital processes were embraced under the three specifications of *increase*, *diminution* and *perversion*. This same arrangement with reference to the function of nutrition will now be observed.

INCREASED NUTRITION—HYPERTROPHY.

Explanatory Remarks.—Such changes of structure as result from increase of the nutritive function are embraced under the name

Hypertrophy. Every organ in the human body is more or less complex in its organization, being constituted of several tissues combined together. One of these tissues may be morbidly increased constituting *simple hypertrophy*, or all the tissues of an organ may be similarly affected, in which case it is denominated *complex hypertrophy*.

Simple hypertrophy in the muscles of voluntary motion is not to be regarded in all cases as disease. The muscles of the blacksmith's right arm may be much larger than those of his left, but it will not do to speak of them as diseased, because by vigorous and continued exercise they have attained a larger growth than their fellows which have been less taxed. A voluntary muscle may however become hypertrophied by long continued spasmodic action, and in that case not only may the enlargement have had its origin in disease, but in some situations may constitute a serious deformity. Torticollis, strabismus, curvature of the spine, etc., may result from excessive development of the muscles of one side of the organ or part, while the antagonizing muscles retain their normal size. Hypertrophy of the involuntary muscles is much more frequently a source of disorder. Thus, excessive action of the heart, kept up for a long time by any cause, as general hyperæmia, obstruction of the lungs, etc., may cause permanent thickening of its walls, and the violence of its action may be the source of much discomfort, alarm, and even danger to the patient.

The muscular coat of any portion of the alimentary canal is apt to become hypertrophied above a stricture, and that of the bladder when there is enlargement of the prostate, stricture of the urethra, or any other obstruction which renders micturition very difficult. It is probable also that there is hypertrophy of the muscular element of the bronchial ramifications in long standing cases of spasmodic asthma; the spasms of the muscular fibers causing an increase of nutrition in them.

Simple hypertrophy of the connective tissue of glandular structures may result from the excessive nutrition attendant on long continued congestion. In these cases the hypertrophy probably results from a low organization of the lymph effused from the congested capillaries, and the new substance not only tends to increase the bulk of the gland, but to compress its vascular and glandular constituents producing atrophy in them, and thus impairing permanently the function of the organ. Such structural alterations are not unfrequent in the lungs and liver when the

circulation is embarrassed by disease of the heart. Granular degeneration of the kidneys and cirrhosis of the liver, probably have their origin in this variety of hypertrophy or intervascular growth. The cellular structure of the lower extremities is sometimes vastly increased in a similar manner as in the affection called elephantiasis. Continued irritation of the skin causes a determination of blood to the part, and if long continued in the same place, may cause hypertrophy giving rise to corns, and callous growths. Irritating affections of the skin give rise to excessive production of cuticular cells, which may be thrown off in detached scales as in lepra, pityriasis, etc.; removal of the original cuticle by peeling desquamation as in erythema and scarlatina; or it may be piled upon the surface to a greater or less extent as in some forms of psoriasis, impetigo, and chronic eczema, and especially of ichthyosis or "fish-skin disease." Similar excessive development occurs on the surface of mucous membranes, but the superabundant epithelial scales are carried away in the fluids which are secreted by these membranes.

Even *complex hypertrophy* does not necessarily constitute disease. An entire organ may be increased to a size disproportionate to the rest of the body because that organ is more constantly used than the others. Enlargement of the uterus in pregnancy, of the breasts during lactation, of a gland as the parotid or kidney of one side when that of the other has ceased to act, etc., may be regarded as instances of normal hypertrophy. Long-continued use of any organ must necessarily cause its enlargement by inducing a determination of arterial blood to it and a corresponding activity of the nutrient function. Such growth may however result in serious mischief in some of the organs. If the brain is thus developed by excessive mental activity, as in very precocious children, the growth of the nervous structures may not be attended by adequate enlargement of the cranium, and the consequences must be compression of the blood-vessels, induration of the cerebral substance and consequent derangement of function. For this reason remarkable precocity in a child can not afford any assurance of future mental superiority, but is rather ground of apprehension that, should he escape fatal congestion and inflammation of the brain, which may be induced by habitual over-excitement, his sprightliness may give way to dullness, and the precocious child become a stupid if not idiotic man.

Exposure to cold, wet and malarial influences, by causing deter-

mination of blood to the liver and spleen, and thus exciting those glands to abnormal activity, and often subjecting them to enormous congestions, has the tendency to produce hypertrophy of all their elementary constituents. Such enlargement of these organs also occasionally occurs without so manifest an external cause, the change probably depending upon some obscure modification of the circulation and innervation of the organs.

The mode in which hypertrophy occurs is not in all cases susceptible of explanation with our present knowledge. In some of the cases I have mentioned and in others that might be cited, where enlargement results from effusion and organization of lymph, new structure is produced in which new blood-vessels and nervous filaments are developed. In the enlargement of mucous and cutaneous follicles, which sometimes become immense tumors, there is evidently a multiplication of the filaments and cells of which they are formed. In muscles of involuntary motion, hypertrophy is generally the result of multiplication of fibers, whether by new fibers being developed from new cell-germs, or by splitting of the original fibers, is not ascertained; but it is almost certain that in hypertrophy of the voluntary muscular tissue, the striated fibers of which it consists are enlarged—not increased in number.

The therapeutic measures for hypertrophy depend of course on the cause, where that can be ascertained. The function of nutrition in the system at large depends upon healthy innervation and upon a due supply of good blood. Excessive nutrition may therefore originate in inordinate nervous stimulation or in hyperæmia, and the first indication in progressing hypertrophy, must always be to calm the functional excitement of the part which causes the increased growth. If a muscle—voluntary or involuntary—is being abnormally enlarged by spasmodic action, the cause of the spasm should be removed if possible. If the excessive growth results from efforts to overcome obstruction,—as where hypertrophy of the heart is caused by obstruction in the lungs, etc., the muscle concerned should, if practicable, be relieved from over-exertion by removal of the obstruction.

Where the cause is local hyperæmia, whether in the form of determination of blood, active congestion, passive congestion, or inflammation, the measures adapted to equalize the circulation and relieve the local affection must tend to arrest the excessive nutrition; and these may be addressed, in most instances, to the nervous system as well as directly to the blood-vessels. Nervous irritation

should be allayed, local depletion employed, and revulsion from the affected part established.

For the reduction of hypertrophy where it has occurred, medicines capable of promoting solution and absorption of the newly formed structures should be employed. Alkalies and their salts and the various preparations of iodine are our chief reliance in this condition. These may even be employed in some forms of progressive hypertrophy, in combination with the general measures already indicated for the arrest of the abnormal growth.

DEFICIENT NUTRITION — ATROPHY.

Explanatory Remarks.—Atrophy signifies want of nourishment, and is used to express the state of organs that have wasted or dwindled from defective nutrition. It may exist in all the tissues of the body at once, in which case the affection is known by the several names, *Atrophia*, *Marasmus*, *Nervous Consumption*, etc., and is characterized by general emaciation; or individual organs or limited portions of the body may be affected alone. This gives rise to a division of this modification of nutrition into two sections, called respectively *general atrophy* and *partial atrophy*. The pathology of both general and partial atrophy is identically the same so far as the condition of the atrophied tissues is concerned, but there is a wide difference between them when we look to the more remote causes by which they are produced. In both cases the condition is the result of a failure in the function of nutrition to supply the place of those portions of the tissues which having become transformed into effete substances have been removed by absorption. It is not necessary that there should be a diminution of nutrition, for the condition may be the result of increased waste merely; still the definition—deficient nutrition—stands good, because had that function been adequately augmented it would have counterbalanced the increased waste and there would have been no loss. It is proper to remark however, that real atrophy is generally attended by diminution of the reparative function.

General Atrophy.—A general waste of the solids resulting in emaciation may be induced by a variety of causes. Excessive and protracted bodily or mental exertion, or even moderate labor continued for a long time with sufficient intervals of rest; the endurance of long-continued bodily suffering or mental anxiety; irritating disease as fever; colliquative evacuations as diarrhea, diabetes, etc.; all tend directly to produce atrophy by increasing the waste

of the tissues, beyond the powers of repair. Some of the causes just named—excessive evacuations—have the additional effect of robbing the system of nourishment by causing its discharge from the system before it has been appropriated to the purposes of nutrition, and fevers have the same effect by suspending the nutritive function and destroying the appetite. Deterioration and waste of the tissues frequently induce hectic fever which then acts as an additional cause of emaciation.

The *symptoms* of this form of general atony, aside from the emaciation, are chiefly seen in the character of the excretions. The urine is alkaline and contains an abnormal quantity of excrementitious matter, especially of urea which is one of the principal products of oxidation of the tissues, and it exhibits a tendency to rapid decomposition after being voided; the perspiration has a strong odor, and the alvine excretions are offensively fetid.

The causes that diminish nutrition are also various, among which the following may be enumerated: 1, An inadequate supply of food as to quantity or quality, or both. The tissues can not be formed with the requisite materials, and these must be contained in the food; and starvation whether effected by withholding food or supplying that which is deficient in nitrogenous elements must induce general atony. 2, Gastro-intestinal disorder sufficient to prevent perfect digestion. 3, Obstruction of the lacteals by disease of the mesenteric glands, or obstruction of the thoracic duct by the pressure of a tumor, may prevent the chyle from entering the circulation; and induration or even congestion of the liver may prevent the system from being supplied with nutriment by absorption into the gastric veins. 4, Failure of the elaboration of nutritive materials after their entrance into the circulation. The process of waste or deterioration may commence within the blood-vessels, and instead of the formation of healthy proximate elements, as fibrin, globulin, and hæmatin from the products of digestion, these products may deteriorate into deleterious substances giving rise to depravity of the blood. 5, The blood may be impoverished by hemorrhages; purulent and serous discharges; inordinate secretions of milk, semen or mucous; and by tumors of large and rapid growth monopolizing a large portion of its nutritive elements. 6, Parasites as worms, hydatids, etc., are occasional causes of atrophy.

In order to determine the true cause of emaciation, then, it will be necessary to scrutinize closely all symptoms associated with it,

and it is highly important to avoid mistaking some of its effects for causes. An inflammatory condition of the system, from the presence of imperfectly developed fibrin and deficiency of red corpuscles in the blood may be the direct result of diseased nutrition, and it would be a terrible mistake to treat such a case on the usual antiphlogistic plan. Many modern writers consider fever as caused by morbid matter in the blood, resulting from abortive assimilation and suspension of nutrition, and there is certainly much plausibility in the theory. The tendency to deterioration of blood and waste of tissues that accompany all grave fevers, and the critical evacuations so apt to occur when convalescence is about to commence, certainly indicate an intimate relation between these diseases and diseased nutrition.

The *therapeutic indications* in general atrophy are: 1, Such measures as are adapted to remove the cause. 2, Such supporting treatment as shall enable the system to sustain itself until the cause shall be abated.

1. Where the system has been over-taxed by exertion and want of rest, a change of habits is of course to be prescribed. Mental anxiety, wakefulness and other forms of nervous derangement may often be alleviated by neurotic medicines, some cases requiring stimulants and other sedatives. Waste of tissues may often be promptly diminished by the soothing influence of narcotics. The causes are too numerous to be here repeated.

2. As much good food as can be readily digested should be furnished to patients in general atrophy, and tonics calculated to promote the appetite and assist the assimilating processes should be directed. I will mention the mineral acids, vegetable bitters, chalybeates, and cod-liver oil as medicines adapted to these ends. Fresh air, moderate exercise, mental quietude, cheerful company, and change of climate and associations are all calculated to strengthen the vital powers and promote the nutritive function. The excretions must of course be kept up, but they should be regulated by appropriate remedies, so that while they sufficiently deplete the blood they shall not act as drains upon the system.

Where the patient is suffering from any wasting discharge, we should determine first, whether it is practicable to arrest such discharge, and secondly whether it would be prudent to do so. When the system has been long accustomed to the drain of an abscess or some excessive or perverted secretion it is sometimes hazardous to suddenly arrest the flow; and where much emaciation

exists, although itself caused by the discharge, it increases the hazard of the experiment. In such cases it is always best to merely restrain the evacuation within the bounds of safety; gradually induce the emunctories to resume their depurative functions, so that effete matters that will be retained in the blood when the morbid drain is terminated, may be disposed of through the natural channels; and support the system by tonic medicines and suitable diet.

Where a wasting evacuation exists, such for instance as diabetes, therapeutic measures are not necessarily to be brought to bear upon the organ through which the discharge is effected. We must look beyond the mere symptom and endeavor to discover and remove the pathological condition of the system or any of its organs upon which the more obvious phenomena must depend.

Partial Atrophy more frequently arises from local anæmia than from any other cause. Disuse of the part may be the ostensible cause, but this produces its effect by the diminished circulation of blood in the capillaries during the period of inaction. Partial atrophy might be divided, as was hypertrophy, into two varieties,—simple and complex—because the waste or deficiency of nutrition may be confined to a single tissue of an organ composed of several tissues. Simple atrophy of one tissue may co-exist and even be caused by hypertrophy of an associated tissue from pressure of the latter on the former (page 137). Effusion of lymph in inflammation may by its organization produce an increase of the weight and size of an organ, and at the same time the proper tissues of the organ may be atrophied and rendered incapable of action. Such is the case in hepatization of the lung, cirrhosis of the liver, etc.

Obliteration of the blood-vessels leading to a part tends directly to the induction of atrophy in that part. Thus the ligation of arteries, ossification of arteries, the existence of aneurism, or the pressure of a tumor on an arterial trunk may cause a wasting-away of the structures beyond the obstruction. The atrophy may however be merely temporary, for there may be an enlargement of inosculating branches sufficient to ultimately furnish a full supply of arterial blood to the tissues of the part. This cause of atrophy is by no means confined to obstructions of large blood-vessels. Portions of an organ as a single lobule or a group of lobules in the lungs or in any of the conglomerate glands, may be deprived of blood by obliteration of minute blood-vessels, and the parts

suffering such deprivation waste away. This is probably a frequent occurrence in tuberculosis, and in chronic inflammation of glandular structures, and especially of the lungs.

Atrophy in any part of the body, if long-continued, is apt to go beyond mere waste of tissue, and present a degeneration of the organic structures that remain, the proper structures being partially or wholly replaced by substances of essentially different character. In *atrophia mesenterica* the mesenteric glands sometimes present an entire absence of their natural structure, the place being occupied by tuberculous matter. The characteristic tissue of the lungs sometimes entirely disappears in chronic pneumonia, the affected portion consisting of a grayish, reddish-brown, or dark-colored substance, of a tough, dense, sometimes almost cartilaginous character.

The therapeutical requirements of partial atrophy depend as a matter of course upon the cause and extent of the affection. Obstructions to free circulation of blood should if practicable be removed, the atrophied tissues should be brought into action as a means of inducing a determination of blood to them, and such remedies should be prescribed as favor the removal of substances which cause atrophy by pressure upon the organic tissues. The last named indication is precisely the same as that mentioned under the head of hypertrophy, because in this case the atrophy is caused by a species of hypertrophy. Please refer to what was said in that connection, page 140.

Atrophy of muscular fibers may often be overcome by the exercise produced under the influence of the slight shocks of an interrupted galvanic current, frequently applied for many days in succession. Glandular atrophy may sometimes be relieved in a similar manner, though in this case it is not necessary that the current should be interrupted so as to produce shocks. Frequent manipulations of a part, and moderate stimulation of the capillaries by rubefacients where a limb is affected, and the use of medicines specifically tending to arouse functional action in an internal atrophied organ may sometimes succeed in causing a resumption of nutrition.

LECTURE X.

GENERAL PATHOLOGY — CONTINUED.

Structural Diseases continued: Perverted Nutrition; General Remarks; Induration—Nature, Causes, Therapeutic Indications; Softening of Tissues—Nature, Causes, Therapeutic Indications; Degeneration of Tissue, Preliminary Observations; Fibrous Degeneration, Granular Degeneration, Fatty Degeneration, Calcareous or Bony Degeneration; Therapeutic Measures for Degeneration of Tissues.

PERVERTED NUTRITION.

Preliminary Remarks.—Having considered those modifications of nutrition which are characterized by increase or diminution of the normal tissues, we come now to the study of those perversions of that function which result in alterations of the tissues in regard to their intrinsic character, or in the production of new substances, structures and growths within or upon the natural organs. This is a very interesting and important department of pathology, and should receive your special attention, as a knowledge of the principles that govern the causes, processes, and therapeutics of alterations of structure will be called into constant requisition when you enter upon the duties of practical medicine. I shall as far as practicable pursue an inductive method of imparting instruction on this subject, by beginning with the more simple alterations in the quality of structures and proceeding to those of a more complex character. In this way I hope very much to facilitate your efforts to master the whole subject. We will if you please commence with

INDURATION.

Nature.—This may be regarded as condensed hypertrophy, since it is produced by the deposit and consolidation of lymph in the interstices of the natural structures, a consequent increase of size. But in true induration not only does the effused lymph fail to produce organized structure of the same kind as that with which it is in contact, but by compressing and cementing together

the constituents of the normal structure changes its physical character in so far that they can no longer be recognized as the same in *kind* with the tissues of the part in a state of health.

Induration does not consist in a mere increase of density, but an indurated structure is really harder, firmer, and tougher than the part would be in health. It is more difficult to tear or even to cut, and sometimes a very soft texture becomes so hardened as to be sonorous when struck, and to sensibly grit under the edge of a knife. A part may feel unnaturally dense without being indurated.

Causes.—This is one of the results of inflammation, but not of the acute form. In acute inflammation the part may be tumefied and dense, but its texture is even less firm than in health—is in reality softened—but after the subsidence of the true inflammatory action, the nutrient function, being partially restored, makes an effort at organization; but the effort results in the hardening of the effused substance in connection with the tissues of the part—in other words, the function is perverted and its results are abnormal.

But inflammation is not a necessary antecedent of induration. The vital tissues may be reduced to that condition in which the nutrient function is similarly perverted without true inflammatory action. All the tissues of the body are liable to induration from various causes. It is said that the inner table of the skull, in some cases of insanity, has presented the hardness of ivory. Glandular induration without positive inflammation is by no means unfrequent. Excitement in the part continued until the exhalant function is exhausted, while there is a degree of determination of blood, causes the interstitial deposit to fall short of normal organization, leaving it in a hyaline or at most granular condition.

The *therapeutic indications* in this case partake slightly of the antiphlogistic character, so far as prevention is concerned, even where inflammatory action is not developed. It is certainly proper to prevent determination of blood, and promote solution and absorption of the deposits which may have taken place. The treatment suggested for hypertrophy, page 139, applies to induration and need not be repeated. It is very remarkable how completely structures sometimes recover their normal texture and condition after extreme induration. This shows that there is no real transformation of the original tissue, but an infiltration of lymph, which becoming itself hardened, and pressing upon the proper tissue so as to condense it, cements the whole into a mass which bears little resemblance to the normal structure. When the abnormal deposit

is dissolved and absorbed, the original is released from involvement and pressure, and may resume the reparative process in a healthy manner, and thus be restored to its original state.

SOFTENING OF TISSUES.

Nature.—As induration was stated to be a species of hypertrophy, so softening is a peculiar form of atrophy. It is certainly attended with loss of substance, and were this all, it would constitute atrophy and nothing more. But this is not all, for in softened tissue there is liquefaction or semi-liquefaction of textures that are not removed, so that the structure is less resisting, more tender, more easily torn or otherwise destroyed by mechanical means. In some of the tissues softening often destroys the organic structure entirely, so that the tissue is reduced to the character of an unresisting pulp, as in the brain and mucous membranes. In others, as the glandular parenchymata and the muscular and fibro-gelatinous tissues, it does not so frequently proceed to the extent just mentioned, but produces want of tenacity and firmness, so that the structure yields readily to slight mechanical force. In softened bones—*mollities ossium*—there is a loss of the peculiar physical property, so that although the bones retain their size and form, they are flexible and unable to sustain the weight of the body or resist the action of the muscles.

The *causes* of softening are different in different tissues; some being exposed to causes which can not operate on others. The stomach for instance, when reduced to a state of very low vitality, is liable to softening under the solvent power of its own secretion—the gastric juice. Softening of the bones is said to be effected by the deposit of fat instead of phosphate of lime, and the substitution of fat for the plastic proximate elements sometimes constitutes a variety of softening in the soft solids. These alterations should however, be regarded as morbid transformations rather than mere softening.

Softening is an early effect of acute inflammation, for the tumefaction and increased density of the inflamed part is almost always attended by diminution of cohesion in its structure. The softening under the inflammatory process may proceed from one degree to another, until complete disorganization is produced and the dead portion becomes melted down into a sanious fluid, which may be removed by absorption or be mixed with the purulent product of the inflammatory action. In this way ulceration occurs.

Softening may however occur independent of inflammatory action. Various local causes may so far depress the vital properties of the tissues, that they can not resist the solvent influence of the fluids with which they are constantly bathed. Some fevers have a special tendency to produce softening of the muscular and fibro-gelatinous tissues, not only by diminishing the quantity and depreciating the quality of the plastic elements of the blood and thus preventing nutrition, but also by favoring the solution of structures previously formed. This last effect is probably produced in two ways—first, depression of the vital properties of the solids; secondly, increase of the solvent power of the fluids.

Recovery from softening may take place, unless the affection has proceeded so far as to destroy all vitality in, and break down the structure of the part. Health some times reappears in structures that have assumed the unequivocal symptoms of incipient mortification.

The *causes* of softening then, are imperfect supply of blood in the part from obstructed circulation, defective quality of the blood in the general circulation, and depression of the vital properties of the tissues involved, produced either by this fault of the circulation or by defective innervation, or by both combined.

Therapeutic Indications.—There can be no room for doubt, it appears to me, that fatal softening, which is one of the results of inflammatory and of febrile affections most to be deprecated, is favored by heroic depletion. An increase of fibrin favors such deterioration of the blood as must tend to the solution of those tissues of high organization, while deficiency of the corpuscular elements, globulin and hæmatin, prevents their nutrition. Both these conditions of the blood are induced by blood-letting—the “sheet-anchor” of the old-school practice.

Where softening is apprehended, and it is always to be apprehended in inflammation and severe grades of fever, the indications are depuration of the blood through the excretory organs; equalization of the circulation among all the organs of the body; and the use of such sedative, stimulant, astringent or tonic medicines as may be required to sustain the nervous powers and impart firmness to the tissues. The remedies should be addressed to the general system, so far as the condition of the blood and nervous system may demand. The part more particularly implicated should be treated with measures calculated to secure free circulation of blood and an augmentation of nervous energy. Emolient,

stimulating, and astringent applications are to be made according to the condition of the diseased part.

DEGENERATION OF TISSUES.

Preliminary Observations.—Under the processes of perverted nutrition the elementary tissues are sometimes replaced by others of essentially different character. This substitution of one tissue for another is called *transformation*, and because the substitute almost always possesses a lower organization than the normal structure the change may generally be properly termed a *degeneration*.

The manner in which transformation of tissues is effected is necessarily obscure, and must remain so until we shall have attained more perfect knowledge of the *modus operandi* of healthy nutrition. We are safe, however, in assuming that it is effected by a vital process similar to that by which tissues generally are removed and replaced. The process of waste, we may assume, goes on in the part as in health, and an effort is made at repair. From some cause, however, this effort is not successful in developing tissue of the kind removed. The cause of failure may be in the defective character of the blood, or which is probably more frequent, in some modification of the vital properties of the tissue whereby its "formative power" is diminished.

There are four principle varieties of degeneration to which the tissues of the body are liable; the *fibrous*, the *granular*, the *fatty*, and the *calcareous* or *bony*.

Fibrous degeneration most frequently occurs in muscular tissue. Muscles, it is now ascertained, are developed from the albuminous element of the blood by a similar process to that which produces the red corpuscles. I do not mean that the change is effected by the same organs, but that the steps of elaboration are similar. The fibrin of muscular fiber differs from the fibrin found in the blood, and is nearly, if not quite, identical with the globulin of the blood-cells. The muscular fiber also partakes largely of hæmatin, upon which its red color depends. These proximate principles are evidently the result of a higher grade of elaboration than ordinary fibrin, which is the material of which fibrous structures are formed. It is plain then, that deficiency in the blood, of the materials for globulin and hæmatin, may prevent the development of the cell-germs of muscular fiber. But it is also plain that a cause sufficient to destroy, or greatly diminish, the vitality of the muscle-producing cell-germs, must as effectually prevent the growth of π

fibers. But while there is deficiency of the proper constituents of globulin and hæmatin or an inability to elaborate them, there may be abundance of fibrin, and this may be secreted and reach the development of which it is susceptible. That this is a plausible explanation of the case, is rendered probable by the fact, that fibrous degeneration is apt to occur in muscular structures that have been long exposed to the influence of inflammation, seated in or near them; for depression of vitality in the tissues, and the development of fibrin in the blood, are uniform effects of inflammation.

Fibrous degeneration occasionally occurs in parenchymatous organs, as the lungs, liver, spleen, and kidneys; but here it is not so clearly a substitution of the fibrous for the proper tissue of the part, but rather appears to be an interstitial growth which, by its pressure, produces atrophy, and perhaps ultimate obliteration of the glandular tissue.

Granular degeneration may occur in any of the tissues. It is evidently the result of an abortive effort at organization, and sometimes constitutes a second grade of degeneration; that is, it takes the place of the fibrous structure just described, after that has been substituted for the natural tissue. This is readily accounted for on the supposition, that the deterioration of the plastic material and especially the depression of vital formative power which caused the first transformation, have increased until there is no power in the part to develop even fibrous structure. This change is, however, the one that takes place at first, especially in the gelatigenous structures, as tendons, ligaments, and the fibrous tissue of the walls of the blood-vessels. It sometimes occurs in glandular bodies, the natural parenchyma of the affected organ being more or less completely usurped by a granular mass of very low organization.

In these cases it is generally the result of interstitial deposits of cacoplastic lymph, which is incapable of any higher organization than the granular. Sometimes the appearance of granulation in the lungs is deceptive. Where the structure is cut or torn it presents the appearance of small smooth granules, which upon close inspection are found to be merely consolidated lymph, which having been effused into the air-cells has been molded to their form. Granular degeneration is one of the pathological changes that takes place in Bright's disease of the kidney, and it constitutes what is usually styled cirrhosis of the liver.

Fatty degeneration affects chiefly the substance of the liver, and

the muscular tissue; though it sometimes attacks other tissues. It consists in the substitution of adipose matter for the proper tissue of the part. It is therefore to be regarded as entirely different from mere accumulation of fat which is a hypertrophy of the adipose tissue. Obesity may cause atrophy of the muscular or other tissues by the pressure which the accumulated fat exerts upon them, but its development is interstitial and can not be regarded as a transformation. In true fatty degeneration of muscle, oil globules make their appearance within the sarcolemma of the muscular fibers and takes the place of the colored muscular element. In proportion as the fibers of a muscle undergo this change, the muscle becomes pale, soft, and weak.

This is evidently the result of a still lower condition of the vital powers than that which produces either the fibrous or the granular degradation. The substitution of fat for the proper tissue is not the result of an effort at nutrition in all cases, if in any; but is an actual conversion of the substance of the tissue into fat by a chemical change. When animal flesh is kept from the air, and in a moist state, it is converted into adipose matter and the same has been found to be true of the livers of the cod and some other fish. So far then from fatty degeneration being the result of low vital action, it is evidence of the loss of vitality in the part immediately affected, and is a species of gangrene in which the formation of fat saves the tissue from actual putrefaction. *Mollities ossium* may be regarded as a fatty degeneration of bone.

The condition of the system that favors fatty degeneration is that characterized by a very feeble circulation and a low state of the respiratory function. It is favored by the habitual indulgence in alcoholic stimulants, by accumulation of biliary matter in the system, and by such circumstances generally as increase the quantity of hydro-carbon in the blood. In particular organs its cause may generally be referred to previous disease, by which the vital properties of the organ have been greatly depressed and the circulation of blood in it impaired. It is often a second or third step in the progress of degeneration being preceded by the fibrous or granular substitution or both.

Fatty degeneration is not an unfrequent affection of the heart; it sometimes attacks the cerebral arteries in cases of apoplexy and softening of the brain, according to Mr. Paget, and the pulmonary arteries in tuberculous affections of the lungs, according to Dr. R. Hall. In the disease of the eye called *arcus senilis*. there is

any degeneration of some portion of the cornea. When it occurs in any of the organs, as the liver, kidneys, pancreas, stomach, bladder, placenta, etc., it is generally preceded by some other structural change by which the vital powers are overcome.

This form of degeneration seems to occur as a normal alteration in many of the tissues as old age advances, in consequence of the gradual diminution of the respiratory function.

Calcareous or *bony* degeneration occurs most frequently in tissues having a low grade of organization. Its nature in most cases is nearer that of petrefaction than real ossification. True bone consists of a fibrous base of animal matter, developed by peculiar germ-cells, and of earthy salts deposited in the interstices of this fibrous structure. Now although the earthy matter present in many cases of calcareous degeneration, very nearly resembles that of bone, it is a mere concretion in the interstices of the affected structure and its deposit is not associated with the production of an osseous animal tissue. Where the original tissue nearly resembles the animal part of bone, the form assumed under this morbid affection, often closely resembles common osseous structure, as in ossification of cartilage and fibro-cartilage; but where it invades the cardiac valves, the walls of blood-vessels, the parenchymatous structure of glands, of the lungs, etc., it can be regarded only as an unorganized mineral deposit. It is a chemical product almost entirely, and consists of an accumulation of concrete phosphate and carbonate of lime.

The manner in which the deposit takes place is not clearly determined. It can only occur in structures constantly moistened by a liquid exuded from the blood-vessels, and it may be that the calcareous matter which the liquid contains, becomes partly insoluble and is therefore left behind when the fluid is absorbed, each successive act of deposit and absorption increasing the quantity of insoluble residue. A more probable hypothesis seems to be, that an excessive quantity of calcareous matter may be attracted to the affected part by albumen in a state of degeneration, which in that condition has a chemical affinity for the salts of lime. The deposit sometimes occurs in situations where this would seem to afford the only explanation of the change, as in ossification of loose inter-articular cartilage and the formation of "phlebolites," which are small detached concretions sometimes found in the veins, and produced probably by the combination of calcareous matter with minute clots of blood.

This form of degeneration takes place by a slow process. Like the fatty degeneration it may occur under the influence of chronic inflammation, and it is always accelerated by inflammatory action when there is a tendency in the system to the calcareous deposits. It is very apt to occur in old age when there is a general decline of the vital powers of the organism, though it may occur at any period of life, when from any cause the formative powers and the nervous and muscular energies are greatly reduced.

The difficulties arising from osseous degeneration consist mostly in interference with the mechanical adaptations. The costal cartilages often become ossified in old persons to such an extent as to prevent free movement of the ribs and expansion of the chest. The thyroid cartilages are sometimes changed to bone, diminishing the power to modulate and causing roughness of the voice. The intervertebral substance and the spinal ligaments in the lumbar region may become consolidated, producing ankylosis of the vertebra to each other and to the sacrum, and consequent inability to bend or rotate that part of the vertebral column. In some localities this change may occur without producing any observable influence, as in ossification of the falx cerebri and tentorium cerebelli, and in obliteration of the sutures of the cranium. When, however, calcareous degeneration invades the structure of the vital organs it is liable to cause serious derangement, and may produce fatal interruption of their functions. Ossification of the cardiac valves is not unfrequently the cause of a failure in the action of the heart; and calcareous degeneration of the arterial walls sometimes renders them so brittle that they are easily ruptured.

Therapeutic Measures for Degeneration of Tissues.—As a constitutional tendency to any of the forms of degeneration has its origin in a failure of the vital powers, it is evident that no treatment will be of any avail, which does not tend to impart vigor to the system and promote a revival of the nutritive function. Such hygienic measures as pure air, moderate daily exercise, bathing and friction to the skin, and wholesome, nourishing diet, adapted to the powers of the digestive organs, are always proper in such a state of the system. Such medicines as tend to improve the appetite, invigorate the stomach, enrich the blood, regulate the secretions, and equalize the circulation, should be prescribed, as seems adapted to each case. The chalybeate and mineral waters from their alterative, aperient, and tonic action, seem adapted to and have acquired some reputation in such affections.

Where the structure of any part suffers degeneration from local disorder of the circulation, as congestion or chronic inflammation, the treatment should be directed to the removal of the local cause and should be chiefly topical. There should at all events be nothing done that can tend to depress the general vital powers. Fibrous and granular degenerations may sometimes be retarded by stimulating liniments applied with friction to the part, by counter-irritation, and the use of alkalies and the preparations of iodine, both externally and internally.

In fatty degeneration it is of course desirable to prevent the accumulation of hydro-carbonaceous matter in the system, without at the same time withholding tissue-making substances. It is therefore judicious to exclude fatty substances from the diet, and encourage the use of lean meats and such vegetables as furnish a large amount of nitrogen. Medicines may be given that furnish a large quantity of oxygen, as this is necessary to secure the combustion and removal from the system of the fatty accumulations. The mineral acids, especially the nitric and nitro-muriatic seem specially adapted to this end. Ammonia is serviceable in some cases, probably owing to the nitrogen it furnishes to the system. Glycerine from its power to liquefy fatty matters, would seem to offer strong inducements to give it a thorough trial. I have made some use of it myself in various low states of the nutritive functions. A short paragraph which I read a year ago in a medical journal, induced me to employ it in several cases of this character, both alone and in combination with other agents, and although my experience with it has not yet been sufficiently extensive to warrant a decided opinion, I feel constrained to advise a thorough trial of its value in degenerations of structure, in strumous and other depraved states of the constitution. Permit me to read to you the paragraph to which I have just referred from Braithwaite's *Retrospect*, Part XXXII., page 79.

"Dr. Crawcour, of New Orleans, draws attention to the advantages resulting from substituting glycerine whenever cod-liver oil is indicated. It is quite as efficacious, is much less disagreeable, does not disorder the digestion, and may be combined with any other remedy. Besides exhibiting great antistrumous power, it materially aids in the assimilation of salts of iron, especially the iodido. Quinine is soluble in it without the aid of sulphuric acid, and becomes divested of some of its bitterness. He gives from 1 to 3 drachms in an ounce of water daily. For it to be successful it is

essential that it shall be quite pure; and both for this reason and its cheapness, Dr. Crawcour recommends Dr. Morfitt's process of decomposing oil or lard with hydrate of lime."

Some authors speak favorably of the use of cod-liver oil in structural degeneration. This, too, exerts a solvent power upon such matters as are found in the system in cases of fatty degeneration. I shall hereafter speak of this agent in connection with tubercular deposits. In regard to fatty degeneration, it appears to me that the oil would be a much more eligible agent if deprived of its margarine, which is certainly difficult of digestion, and might tend to favor the very form of disease for which the oil is administered. As there is an article on this very subject in the Journal from which the paragraph just read is found (page 77), it may not be amiss to read a part of that also, especially as I shall have occasion to refer to it hereafter. It is from the pen of Dr.

ARTHUR LEARED:—

"The utility of cod-liver oil in a great variety of diseases is now so fully established, that the mode of its administration is a point of corresponding interest. From my experience of this remedy, however, chiefly at the Brompton Hospital for Consumption, and at the Royal Infirmary for Diseases of the Chest, London, I have satisfied myself that, in certain cases, it can not be at all tolerated; while, in others, the inconveniences from a persistence in its use are so great as to render it of very questionable propriety. Every one who has extensively prescribed the oil internally will, I think, agree with me in this. In many instances, however, this arises merely from a repugnance to the sensible properties of the medicine. Its taste, smell, or the oily sensation left by it in the mouth or fauces are complained of, and occasionally induce nausea, and even vomiting. By proper management, the difficulties in question are, nevertheless, usually got rid of. But it is not my intention to enter here into these matters. More serious obstacles present themselves, in the shape of dyspeptic symptoms, of various degrees of severity, occurring some time after taking the oil. These are—loathing of food, eructations having the taste of the oil, nausea, sometimes attended with vomiting, cardialgia, severe abdominal pain in the region of the duodenum, etc. I have observed the last-named symptom to be in some cases a prominent one, and I lay stress upon it for reasons to be afterward explained. Against the foregoing train of symptoms the measures usually employed in dyspepsia are sometimes successful, but in

other cases they utterly fail. I have tried bismuth, hydrocyanic acid, bitters, mineral acids, and alkalies, with the same negative results. The times of taking the oil, as well as the kind taken, have been changed in vain. Although otherwise strongly indicated, a persistence in the use of the oil under such circumstances would of course be highly injurious. I have frequently observed that patients who suffered most from the after-effects of the oil, exhibited no repugnance to the act of taking it. The practice I am about to advocate in cases so refractory as those referred to, was suggested by a theory of my own of the digestion of fat. I must beg to refer to the 'Medical Times and Gazette,' of June 8, 1854, for a detailed explanation of my views. It will suffice to mention here that I regard the pancreatic secretion as subservient to the digestion of fats and oils, in virtue of its power of resolving these bodies into their immediate principles, stearine, margarine, oleine, or into the two latter, which are those of cod-liver oil. I have also advanced the opinion that it is the oleine which is alone available for nutrition, and that the others are excrementitious. This theory, it will be observed, is very different from that of Bernard. According to the latter, fatty bodies are absorbed in a state of minute mechanical division, effected through the emulsifying power of the pancreatic fluid. From my own experiments, and having observed that the digestibility of fats and oils appears to be directly proportionable to the relative amount of oleine in their composition, I determined to try the effects of oleine practically pure, derived from cod-liver oil.

"For this purpose a considerable quantity of it was prepared from my directions, by Messrs. Butler and Harding, chemists, St. Paul's Church-yard. The process employed consisted in submitting the oil to a very low temperature, and separating the oleine by pressure from the semi-solid mass thus produced. I am informed that 75 per cent. of oleine was about the average yielded. Thus obtained, it is a very liquid, and, at ordinary temperature, a very transparent fluid, agreeing in color with the oil from which it is prepared.

"Its freedom from margarine may be tested by submitting it to as great a degree of cold as possible, when there should be no actual precipitate, but a certain amount of cloudiness usually occurs. Of its exact analysis I can only speak conjecturally; that of the oil itself is, however, well known. If, therefore, the good effects of cod-liver oil are largely ascribable to certain substances

in combination with it, as iodine and bromine, there is a strong presumption that oleine is superior, as containing a larger proportion of them. Gaduine, a peculiar principle of cod-liver oil, to which its efficacy has been also ascribed, according to De Jongh, who discovered it, adheres to the oleine when the margarine is separated, and is isolated only with great difficulty. Gaduine, therefore, will be administered in larger proportion in the oleine than in the oil itself. If, then, in the latter case, oleine is assimilated to the exclusion of margarine, no doubt can exist that oleine is the most active remedy in all cases in which the oil is indicated. It is my present purpose to maintain that in certain cases oleine is alone available, and that its efficacy is at least not inferior to the oil. The question, in its more extended shape, remains to be tested by further clinical experience." * * *

"I can not, however, recall a single instance in which the use of the oleine in the same or even larger doses than the oil, was unattended with good results. In some instances, * * * severe pain and obstinate vomiting caused by the oil, were at once removed by changing it for oleine. I may here observe, that although in many cases dyspeptic symptoms are at first induced by taking the oil, a persistence in it appears to overcome them. There are other cases in which, although the oil is well borne at first, the system afterward rejects it. In the latter cases the oleine is the most useful, and I have almost invariably found, that the oil could be replaced by it with the best effects. I have also noticed in England, as no doubt others have as well, that taking cod-liver oil is much less irksome to certain patients in winter than in summer. Inquiries which I made among retailers of the drug in London, as to the sale at different seasons, go to prove this remarkably. In this point of view cod-liver oil oleine is of interest as regards warm climates like this. For although the well-known theory of Liebig of the uses of fat in the economy may be adduced to explain the effects of temperature alluded to, it is highly probable that the superior digestibility of oleine would cause it to be better tolerated in hot climates than the oil."

I believe no satisfactory mode of treatment specially adapted to the counteraction of calcareous deposits has yet been discovered. The general indications to sustain and promote constitutional vigor, and remove low inflammatory action, where it exists, are about all I have to suggest in this relation.

LECTURE XI.

GENERAL PATHOLOGY—CONTINUED.

Structural Diseases Continued: Deposits in or upon Tissues; Preliminary Observations; Euplastic Deposits or Cicatrices, Repair of Injured Structures. Management of Injuries; Cacoplastic Deposits, Definition and Description. Their Tendency to Degenerate, Causes; Aplastic Deposits—Yellow Tubercle, Description, Softening, Absorption, Effects on Structures, Liability of Different Structures, Liability of Different Ages, Nature, Cause. Microscopic Characters, Chemical Analysis; The subject of Morbid Deposits Reviewed: Therapeutic Indications.

DEPOSITS IN OR UPON TISSUES.

Preliminary Observations.—In certain modifications of the nutritive function there is a tendency to the deposit of matter in or upon the natural tissues beyond the amount which would be required by the reparative process, in a state of health. The deposits of which I am now speaking do not take the place of the normal structures as do those that occur in degeneration of tissues, but are new substances added to the part. The nature of these new formations is determined by the condition of the system at large, or of the special locality in which they occur in regard to the qualities of the blood-plasma and the nutritive and absorbent functions.

It may be well to spend a few moments in a preliminary consideration of the nature of the different kinds of material of which these deposits are formed, with the view of enabling you to appreciate more readily the difference of character presented by the deposits themselves, as well as the mode of their development.

In a state of health the tissues of the body are constantly bathed by the fluid called lymph, which is poured out from the capillaries and contains the materials for nutrition; the overplus being taken up by the absorbents and returned to the circulation. This process of exudation and absorption of lymph, is inseparable from the development of the structures that are developed in connection with the functions normally belonging to the part in which they

are produced. But where injury or disease changes the condition of a structure, there is generally a change in the quality of the exhaled fluid, and a change also in the vital formative action by which that fluid is transformed into tissue.

EUPLASTIC DEPOSITS OR CICATRICES.

Repair of Injured Structures.—Before calling your attention to the lower grades of organized deposits, I will briefly advert to those which occur in ordinary states of the nutritive function in the repair of injured structures. These deposits constitute cicatrices, and where formed from healthy lymph, under favorable circumstances, can not be regarded as abnormal although their structure may differ from that in which they are produced. In those structures of the body which have a low organization, as the fibro-gelatinous, cicatrization may produce a new structure very nearly like the original; but in the more highly organized tissues, repair of injuries by this process is effected by the development of a lower grade of organic structure. Still the new structure being formed of good lymph and being permanent in its character is denominated *Euplastic*, (from *eu*—good or well, and *πλασσω*—to form.

A smooth, clean incision, the surfaces of which are promptly brought into perfect coaptation, will, in a healthy individual, grow together by what is called by Dr. Macartney “immediate union,” that is, with little more effusion than occurs in undivided, healthy tissue, and without increased heat or redness. Here the process is precisely the same as that constantly taking place in living tissue. But where the incised surfaces are slightly separated, the space between them is soon filled by coagulable lymph, and this becoming organized, forms a bond of union by which the injury is repaired. In this case, there is a slight determination of blood and exaltation of temperature and sensibility, but no inflammation in the true sense of that term. This mode of repair is called by modern writers “union by the first intention.” When the parts have been too far separated for the entire quantity of lymph to be at once organized under the vital formative power of the adjacent tissues, or where there is much loss of substance, a determination of blood to the part occurs, and considerable excitement of the vital properties is produced. The cavity is soon filled by a “nucleated blastema,” and from this fluid new tissue is gradually developed, and that too, under favorable circumstances, without inflammation or the production of pus. In this way consider-

and the severed the divided ends of a tendon or muscle may be united, when the division is subcutaneous so that the atmospheric influence is excluded. This is what Dr. Macartney calls the "perfect repair." But if the wounded surface is exposed to the atmosphere, inflammation is produced and a large portion of the original structure is wasted, because the "exudation corpuscles" are prevented from attaining their perfect development, and are separated from the living tissue by the profuse effusion of blood and pus under the inflammatory action—and they degenerate into scabs and are cast off. New tissue is in this case formed by the action of the inflammation, and the process is called repair by the "inflammatory action."

These several modes of repair will aid us in understanding the nature of these deposits that form the topic of this lecture. We should observe that they depend upon an adequate supply of blood to the part, and that the promptitude and completeness of the repair is effected depends also upon the condition of the injured part. Where there is perfect coaptation the repair is accomplished at once with scarcely a change in the healthy condition of the part: but in proportion as the healthy function is interrupted by separation of wounded surfaces, loss of contact with the atmosphere, and consequent exposure to atmospheric influences, and consequent suppuration, the recovery retarded, but the results are nearly the same. The formation resulting from suppuration is not so perfect as the repair resulting from the separation of nearly resemble the original structure, and the new tissue is organized in the absence of inflammation.

Our chief duty in relation to this subject is to regulate the condition that shall favor the most perfect repair, and to prevent inflammation, for wherever inflammation exists mischief. We should aim to regulate the condition as the best possible mode of repair. We should favor the "modeling" of the part, and we should favor the "moderation" of inflammatory action, which renders repair slow and unsatisfactory. We should regulate the temperature. A moderate temperature—the constant application of heat or cold—should be used to keep the part dry. If the part is exposed to the air, i. e., if the air is excluded, the part should be kept as shall favor a moderate

circulation of blood in the part, repair will generally take place promptly without the application of moisture, though perhaps not quite so rapidly in some cases. But sometimes, and especially where the injury is extensive, wet dressing is indispensable in regulating the temperature. Dr. Macartney advises the application at first, of "steam at a high but comfortable temperature, the influence of which is generally stimulant, and at the same time extremely soothing." After the pain has passed off he recommends the continuance of the steam, but at a lower temperature: I have not thoroughly tested this treatment, but am favorably inclined toward it where circumstances render it convenient. But simple water dressing as a means for preventing inflammation, and of repressing it when commenced, has now received the favorable verdict of the entire profession. The water should not be applied ice-cold, for that would arrest the reparative process, but the temperature should be such, that while it represses undue excitement, it affords comfort to the patient and favors the vital processes.

We will now, if you please, pass from these processes which may in one sense be regarded as normal, since they are required for and accomplish the repair of injuries, to the consideration of deposits which are truly pathological.

CACOPLASTIC DEPOSITS.

Definition and Description.—In certain states of the system the blood does not supply a good plastic material, and then the nutritive function, whether engaged in the repair of mechanical injuries or in supplying the waste of the tissues, fails in producing normal results. The fluid effused from the blood-vessels may be *cacoplastic* (from κακος bad, and πλασσω, to form) or *aplastic*. *Cacoplastic* lymph, although in some degree organizable, produces a tissue lower in the scale of vitality than the structure in which it is produced. You have probably all seen tough, hard, and opaque seams in the skin, resulting from the healing of scrofulous sores. Such cicatrices often follow inflammation in the deep-seated tissues and organs in bad states of the system, and evidently depend upon a vitiated quality of the blood. It is not always however that the whole blood is at fault. The cause of low organization may be local, and exist either in the nature of the injury, or in some local modification of the blood-vessels. Thus the scars of burns and scalds often present cicatrices of dense, contracting structure, which draws upon the parts to which it is attached;

puckering and distorting the integuments, and sometimes producing frightful deformities.

These structures differ from each other under different circumstances. Sometimes they are vascular, sometime destitute of blood-vessels, but their organization is always inferior to that of normal cicatrices. Their production in healthy persons is always preceded by severe inflammation, and this may be the circumstance which modifies the exuded lymph and the vitality of the part so as to cause the degradation of the reparative process. Such deposits are very often found, upon post-mortem examination, in various organs of persons advanced in age, and who have been long afflicted with bad health. The investing membranes of the liver, spleen, lungs, heart and brain are often thickened, and the internal structure of some of these organs not unfrequently exhibits deposits of this kind, in the form of coarse and irregular granulations, as in the liver and kidneys, or firm, hard, fibrous substance as in some cases of partial consolidation of the lungs. Sometimes a single organ is so modified in its vital condition by disease, that it is predisposed to formations of this character. In other cases the predisposition seems to exist throughout the system.

Their Tendency to Degeneration.—Microscopic examinations of cacoplastic deposits, shows that they not only differ from the normal structures and from each other, but that the same specimen undergoes more or less change after it is formed. It is very seldom that all the constituents of the same deposit attain the same grade of vitality. Some portions of its structure are generally fibrous, others granular, and others entirely amorphous, or containing an admixture of cells more or less developed. The amorphous substance soon becomes softened and is carried away by absorption. The granular deposit may subsequently be removed in like manner, and this explains why these formations have such a tendency to contraction and consolidation. From this cause old adhesions and cicatrices resulting from inflammation, burns and scrofulous sores, become hard, tough and dense, and present oftentimes nearly all the characteristics of fibro-cartilage.

Where a considerable portion of the cacoplastic growth reaches the fibrous development, the change that subsequently occurs does not break up the structure, but as has been said, the formation contracts and produces more or less deformity of the part. Where this takes place in a parenchymatous organ, as the lungs, liver or kidney, it diminishes the size of the affected part, and by drawing

the surrounding parts into smaller compass, compresses the healthy tissue, interrupts the circulation, and in this way produces atrophy. It is not uncommon to find the apex of the lungs greatly diminished in size and drawn into a knotted or lobulated condition, where there is no reason to believe there has been loss of substance by softening of tubercles and suppuration. Contractile disease sometimes attacks the liver and kidneys, in which cases the fibrous deposit coexists with granular and fatty degeneration. When the less organized deposits are removed, the fibrous deposit contracts, and in this way large portions of the gland are reduced in dimensions, hardened and rendered useless.

Where there is a large preponderance of the granular and amorphous deposits, the whole cicatrix is apt to degenerate and soften down, and the breach of continuity which was repaired by it, is thus reproduced. This explains the tendency of scrofulous and other ill-conditioned ulcers to reopen after being healed.

This form of contractile structure sometimes occurs on the surface of serous membranes, and of blood-vessels, constituting a variety of false membrane, which contracts the surfaces on which it is formed, and when it occurs in blood-vessels, whether arteries or veins, diminishes their caliber, not only by occupying space, but by constricting the walls as the process of contraction goes on. The same kind of deposit also frequently occurs immediately beneath the mucous membranes and forms permanent strictures, as in the rectum, urethra, etc.

There are certain forms of tubercle that evidently belong also to this class of deposits. These are characterized by a dense structure and by the small tendency they have to softening. Of this character are the semi-transparent, the gray, and the tough yellow forms of tubercle. These varieties of tubercle are indeed very often found in the same subjects in which the fibrous and granular deposits, of which I have been speaking, occur. Thus in a majority of cases of granular disease of the kidneys and liver, traces of tubercle are found in the lungs; and on the other hand, the existence of the hard miliary tuberculous deposit in the lungs, is very generally attended by cacoplastic degenerating deposits in the liver or kidneys.

All tubercles evidently possess a lower grade of organization than the cacoplastic fibrous deposits, and yet some of them contain a considerable portion of fibrous tissue, so that when the granular and amorphous constituents degenerate and are removed, the

fibrous residue contracts, appears to become more highly organized, and forms a permanent structure ("cornified tubercle"). It is in this way that those contractions of lung-tissue, of which I recently spoke, are produced. Whenever this form of more highly animalized tubercle occurs, whether on or beneath membranes or in the structure of organs, its degeneration is followed by contraction of the surrounding structures, compression of blood-vessels, interruption of function, and if the deposits are extensive they may in this manner produce fatal results.

Causes.—Thus we find every grade of organization presented by this cacoplastic formation, from the firm, dense, fibro-cartilaginous cicatrix to the non-fibrous miliary tubercle. All of them evidently depend upon some defect of the blood-fluid from which they are formed, owing either to a bad state of the blood in the system generally, or to some vitiating cause in the part where the deposit occurs. In the case of burns and scalds, it is probably the result of the excessive inflammatory action which so far depresses the vitality of the part affected, that, although the blood at large may be good, yet the lymph effused is depraved in passing through the capillaries of the part, and by contact with the almost devitalized surface of the wound. But in scrofulous subjects and those whose systems show a tendency to deposits of this character, whether under inflammatory disease or not, the cause must be sought in the constitution of the patient, and especially in the depraved quality of the plastic material of the blood.

APLASTIC DEPOSITS.—YELLOW TUBERCLE.

Description.—The more common form of tubercular deposits do not possess originally so high an organization as that just described where degeneration leaves a fibrous, contracting, cornifying residue. The original tubercle may differ very little in appearance and density from the semi-transparent, gray, hard bodies just mentioned, and still they may very soon lose that character and degenerate into the opaque, yellow, cheesy consistency of soft tubercular deposits. When this change is to occur a yellow spot appears at some point within the tubercle, which gradually enlarges until the whole tubercle is reduced to a mass of amorphous, opaque, yellow, curdy matter, that yields under slight pressure.

Although the term tubercle signifies a round body, and has been applied to this species of deposits because they generally assume the form of small rounded bodies varying in dimensions from the

size of a millet-seed to that of a cherry-stone, yet the deposit does not always take that shape. It is sometimes infiltrated into the tissues or upon surfaces, where it yields to pressure and assumes whatever form its position may determine. When deposited in this form, it may originally consist of the same constituent elements as the rounded semi-organized miliary tubercles, and undergo the same modes of degeneration.

But tubercular matter does not always attain the degree of organization I have mentioned, being sometimes deposited originally as an opaque, yellow, cheesy substance, without structure, and constituting the true aplastic deposit.

Softening of Tubercle.—Whether the tubercular matter is originally deposited in the aplastic character, or degenerates to that condition, it is subject to changes that reduce it to a still lower state. Its softness increases and it is ultimately broken down into a semi-fluid, pus-like matter, and the seat of the tubercle is converted into an abscess or into an ulcer if located on a surface. Several tubercles are often closely aggregated together, and as all may undergo the softening process at the same time, a large abscess is then produced, and when its contents are discharged an open cavity is left, if the surrounding tissues have become sufficiently hardened by inflammatory infiltration to form an unyielding wall, otherwise a collapse takes place as the softened tubercular matter is discharged. The same statements apply to the softening and discharge of infiltrated tubercular matter.

Absorption.—Sometimes, however, the tubercular matter does not degenerate into the purulent character, but is gradually absorbed, and an earthy calcareous substance is deposited in its place, which having no irritant properties, and undergoing no further change, may remain for years without exciting disturbance in surrounding tissues. This is probably the most favorable termination that such deposits can ever reach. It is certainly better than the formation of a cavity even were it certain that cicatrization would occur, or the fibrous transformation heretofore mentioned, as in either of these terminations there is loss of an equal quantity of tissue, and the contractions which the cicatrix causes in the surrounding structure interferes with their functions to a greater or less extent.

Effects on Structures.—The most frequent effects of softening tubercle are inflammation, ulceration in the direction of an adjacent surface, and discharge of the matter. The cavity thus formed and the sinus produced by the ulcerative inflammation are

lined by a membrane, and sometimes consist of the surrounding tissue more or less consolidated, and in either case continue for a long time to secrete a purulent fluid in which there is often an admixture of cheesy, tubercular matter.

Sometimes the tubercular matter remains for a long time without undergoing degeneration, and if not extensive, may permit the individual to attain old age without disturbance from this source. Where the tuberculous diathesis is strong, very extensive deposits may occur before softening in any of them commences. When this change commences in such cases, it often progresses with such rapidity as to prove fatal in a few months, or even weeks. Not unfrequently too, the presence of extensive tubercular deposits in the structure of a vital organ may monopolize so much of the structure as to produce fatal functional disturbance before softening has commenced.

Liability of Different Structures to Tubercular Deposits.—Although the lungs are generally spoken of as peculiarly liable to tubercular disease, it is by no means confined to them. Every part of the body may be the seat of these deposits. If they exist elsewhere they will generally be found in the lungs also, but not always, especially in children. The other structures exhibit liability to tuberculous deposits in different degrees. This liability, as determined by the frequency with which the affection is discovered in post-mortem examinations, may be briefly stated thus: 1, Lungs. 2, Intestinal canal. 3, Lymphatic glands. 4, Larynx. 5, Peritoneum and pleura. 6, Piamater. 7, Brain. 8, Spleen. 9, Kidney. 10, Liver. 11, Bones and periosteum. 12, Uterus and fallopian tubes. 13, Testicles and prostate. 14, Spinal cord. 15, Muscles of animal life. (Rokitansky.) In children the lymphatic glands are more frequently attacked than the lungs.

Liability of Different Ages.—Tuberculosis may occur at any period of life. It is seldom known, however, to attack children less than two years old. It is somewhat frequent between the ages of two and four, and is quite so from the fourth year to puberty. It is then less frequent up to about eighteen, and from this last period to the age of forty the cases are numerous. The liability diminishes after forty, and the disease very seldom commences in old age.

It has already been stated that the presence of tubercles, especially when they are degenerating, tends to produce inflammation. It is equally true that the occurrence of inflammation in a subject of the tuberculous diathesis greatly promotes the rapidity of such

deposits, and hastens the softening of those already formed. A larger quantity of tubercular matter, says Dr. Carpenter, may be produced in the lungs, after pneumonia has existed for a day or two, than it would have required years to generate in the previous mode.

Nature of Tuberculous Disease.—Although the deposit of tubercular matter gives rise to local lesions in the structure where it occurs, the disease must certainly be regarded as a constitutional affection. The tendency of tubercular deposits to occur in so many structures at the same time, is in itself sufficient to refer the malady to some vice of the system. Observation establishes the existence of what is termed the tuberculous diathesis, but in what peculiarity of constitution that diathesis consists, it is somewhat difficult to determine. That the blood is at fault when the deposits make their appearance is clearly ascertained. It is deficient in red corpuscles and coagulable fibrin. The serum has in some cases been found tinged with red coloring matter, as from disintegrated blood-cells. The serum is said to contain an excess of albumen in the beginning, and after the deposits have developed inflammatory disease, there is commonly an excess of fibrin.

But the question arises as to the *cause* of defect in the quality of the blood. In what part of the system does the failure in the processes of sanguification occur, and what is the cause of such failure? We can only answer these questions by saying that there is either a general deficiency of vital energy in the system, or some of the organs concerned in the elaboration of the blood are either congenitally feeble and inefficient, or have been rendered so by causes operating in some way upon them. But debility alone in the digestive or assimilative functions is insufficient to account for the tendency to this particular form of disease. Thousands of persons are greatly debilitated from various causes, and remain in that condition for years without the appearance of tubercle. There is some peculiarity of organization which constitutes a predisposition to tuberculous disease which lies behind all debilitating or exciting causes. That such a peculiarity of constitution may be acquired after birth is possible, but it is almost certain that in a vast majority of cases the taint is hereditary. The individual is not born with the disease, but he inherits a peculiarity of organization that predisposes him to it. We all see children resembling their parents in the size, outlines, and complexions of their persons, and in various other visible peculiarities, and it is not difficult to infer that

they may also resemble them in the intrinsic qualities of their tissues, and the tendency of those tissues to undergo such modifications, when exposed to the influence of exciting causes, as characterize the tuberculous or scrofulous diathesis.

The possession of such an organization does not render tuberculosis inevitable. The individual being forewarned of his danger, and instructed in the means to be employed to ward it off, or even without such knowledge, if he happen to pass through life without sufficient exposure to exciting causes to produce the disease, may die of old age without a vestige of tubercle being present in his system.

The *microscopic characters* of yellow tubercle form an interesting subject of study. Before softening they usually present the following peculiarities: 1, A hyaline structureless matrix. 2, A great number of minute granules. 3, Corpuscles of peculiar character. The granules and characteristic corpuscles are imbedded in and held together by the translucent matrix. The corpuscles are the distinguishing constituents, which enables the microscopist to determine with certainty the character of the deposit. They are different from all other corpuscles. Their shape is polyhedral from being pressed together, and their angles are rounded, so that they give evidence of their original spherical form. They vary in diameter from $\frac{1}{8000}$ to $\frac{1}{2500}$ of an inch. Each corpuscle consists of a transparent envelop, containing within it translucent matter of a solid consistence, and from three to ten or more granules. They are not affected by water, but acetic acid renders them more transparent, and would enable us to see a nucleus if one were present. *These corpuscles contain no nucleus.* They are therefore easily distinguished from pus globules, which are larger, spherical in shape and *nucleated*. The softening process liquefies the amorphous, hyaline substance, and the granules and corpuscles float in it. The cells then become larger by imbibing moisture which swells them out into the spherical form. Subsequently the investing membrane of the corpuscle is dissolved and the contained granules are set free, and are added to the granular constituent of the tubercular matter. The fluid now very much resembles pus in appearance, but contains no pus-globules, unless it has been obtained from the vicinity of suppurating tissue.

The *chemical analysis* of tubercular matter, according to Dr. Glover, is as follows:

Fats	3.375
Extractive matter soluble in alcohol and water with some loss	3.750
Chlorides225
Earthy phosphates290
Alkaline salts250
Protein residue	10.860
Water	81.250
	<hr/>
	100.000

The protein residue, which constitutes the base of the organic structure of tubercle is chiefly composed of albumen, with occasional traces of fibrin and pyin. Casein is said to have been found in some specimens. Dr. Glover however failed to detect either pyin or casein.

The Subject of Morbid Deposits Reviewed. We are now, I believe, prepared to review the whole subject of morbid deposits with some hope of arriving at a satisfactory conclusion in regard to their nature. They evidently have their origin in a defective state of the assimilative powers of the system, either congenital or acquired. The predisposition tends to increase itself by deterioration of the blood. Nutrition is thus doubly affected. Being feeble at best, as are all the vital functions, it is now furnished with defective material for the nutritive process, and under the disturbing influence of irritation, injury or inflammation, the efforts of this function to effect repair prove abortive. A fluid is effused from the blood-vessels which in some cases is susceptible of organization only a little below that of healthy plasma; in others it is incapable of progressing beyond the development of granules. Where there is a breach of structure, as in the case of wounds, the cacopastic or aplastic fluid is effused from the blood-vessels, and undergoes the subsequent changes under the influence of the vital properties of tissues with which it lies in contact. But when the deposit is interstitial, as that of tubercle, it is probably the result of cell-development similar in manner to that by which ordinary nutrition is effected, but owing to the low state of vitality and the bad quality of the blood-fluid, falls short of the production of normal tissue. The peculiar tubercle-corpuscles evidently have this origin.

It is evident, then, that whatever tends to diminish the constitutional vigor must be regarded as a cause of such deposits as we have been considering. Scanty or bad food, long exposure

to impure or damp air, confinement from the light of the sun, close application to sedentary pursuits, habitual over-exertion of body or mind, constant mental anxiety, the influence of grief and other depressing passions, the indulgence in such excesses as induce indigestion and functional torpor or structural disease of the secretory organs, frequent exposure to sudden or extreme vicissitudes of temperature, all tend to depress the vital powers of the system, to vitiate the blood, and consequently cause perversion of the nutritive function. Carried to their extreme results such causes can not fail to produce a cacoplastic condition of the system, even where no defect of constitution originally exists. But where there is a hereditary predisposition to strumous degeneration, the deleterious consequences are more rapidly developed and are manifested in greater degradation of the nutritive function. In such cases tuberculosis is the natural result.

The *therapeutic indications* can only be summarily adverted to in this relation. The details of treatment must of course vary with the peculiarities of each case with regard to the kind of deposits, their situation, extent, and the degree of constitutional or local disturbance that may have caused them, or which they may have produced.

In the management of all cases of perverted nutrition the practitioner should keep in view three conditions: 1, The depraved state of the blood; 2, Unequal distribution of the blood; 3, The existence of morbid deposits, their changes and effects.

1. In regard to the depraved state of the blood, two classes of causes may require to be removed or counteracted: *First*, those that prevent the development of plastic elements; *Secondly*, those that cause the accumulation of deleterious substances. In other words, the indications are to enrich the blood with normal constituents, and purify it by the removal of abnormal matters.

If the patient has been starved, if he has lost blood by venesection or accidental hemorrhage, or has been reduced by the wasting influence of fever or some excessive discharge, he should be supplied with nutritious, easily digested food, adapted to the state of his stomach, and the wants of his system. If he has been confined to a dark room, compelled to breathe unwholesome air, or accustomed to sedentary habits, he should be brought out to enjoy day-light and free air, and induced to take daily exercise according to his strength. If he is melancholy, or oppressed with grief or anxiety, he should be introduced to cheerful society, new scenery, and

made as happy as circumstances will permit. In the mean time such measures and medicines as promote digestion, and impart vigor to the system and deficient elements to the blood, should be employed, as bathing, vegetable tonics, and preparations of iron.

The second indication for correcting depravity of the blood, requires such measures as tend to open any suppressed excretions, and in some cases to excite some of the emunctories, as the skin, intestines, kidneys, liver, or lungs, to increased action, with a view of throwing morbid matters out of the system. Care must however be taken that such action shall not debilitate the patient.

2. Unequal distribution of the blood must be treated by such measures as tend to equalize the circulation. There may be hyperæmia in one part of the system, and anæmia in another part. As a general rule, mild counter-irritation is all that should be employed. The debilitating influence of cantharides renders the use of the common blister objectionable in this state of the system, however beneficial it may be under some other circumstances. Bathing, friction over the whole surface, and the application of rubefacients or mild vesicants perseveringly pursued, will accomplish about all that can be done to equalize the circulation. Such measures are at the same time corroborant to the measures required for purification of the blood, as they promote elimination by exciting the excretory function of the skin.

3. The existence of cacoplastic or of aplastic deposits, their changes and effects in the system, constitute the third and by no means least important element in the therapeutics of perverted nutrition. It is certainly desirable to accomplish one of two things in regard to such deposits. Either to cause their removal from the system, or to reduce them to a quiescent and unirritating condition. The leading difficulty in our way here lies in the fact that such deposits have no vascular connection with the tissues, and are therefore beyond the reach of such solvents as can be introduced into the system, and are also in a great measure, beyond the reach of the absorbent vessels. Medicines possessing solvent properties sufficient to act upon these deposits, are very likely to attack the normal but debilitated tissues around them. In this way much mischief has doubtless been inflicted by the use of mercury.

The alkalia and their carbonates, and the iodide of potassium, have acquired some reputation in the treatment of morbid deposits.

They certainly do produce good effects in many cases, and may be very extensively employed without injuring the blood or impairing normal structures.

Inhalations have within a few years attracted much attention from the pretentious announcements of men claiming to have attained almost infallible control of tubercular disease by such means. Great secrecy was affected by these charlatans for a time, but their remedies have mostly, I believe, leaked out, and prove to be about the same with which the profession has long been familiar. I shall hereafter say more on this subject when I come to speak of diseases of the lungs.

Turpentine and various other balsamic agents have been long employed but with varied results. In some cases they appear to be beneficial, probably from their soothing and stimulating properties, by which cough is moderated and profuse purulent discharges assuaged, but it is very doubtful whether they exert any direct influence upon tubercular matter, or other morbid deposits.

There is perhaps no agent that has acquired so high a reputation among scientific practitioners, for the treatment of diseases characterized by aplastic deposits, as the cod-liver oil. The voice of the profession has been raised in its praise, with a unanimity almost without parallel. From the testimony adduced in its favor, and from my own experience with its use, I hesitate not to say that it is a most invaluable agent.

The mode of its operation has been variously explained. It evidently contains a large amount of nutriment, capable of being transformed into blood plasma, and organic structures. Dr. Williams says: "The present state of our knowledge appears to justify the conclusion, that cod-liver oil is chiefly beneficial as an oil, supplying a material which enriches the blood, affords both combustible and nutritive elements, and penetrates throughout the tissues and deposits, softening their concrete fat, and rendering more supple and solid their fabric. The superiority of cod-liver oil over other oils seems to consist in its easier digestibility by the stomach and chylopoietic organs, which is probably dependent on the bile and perhaps other ingredients which it contains. The nutrient properties of cod-liver oil have been proved by its increasing the proteinaceous constituents of the blood (except the fibrin which is diminished), and Dr. Theophilus Thompson has ascertained that the same result has followed the use of the cocoa-nut oil."

The oleine of cod-liver oil has recently been employed as a substitute for the oil itself. Glycerine is also attracting attention at the present time as a substitute, and being so much more pleasant an article in every respect, it will certainly take the place of the oil, if it shall prove upon thorough trial to be equally efficacious. I read you some paragraphs on this subject yesterday.

I must for the present dismiss this topic, but I can not do so without admonishing you to avoid the old dogma, that tuberculosis is a local disease with constitutional disturbance. It is a constitutional disease with local, secondary lesions, and as such is to be treated.

LECTURE XII.

GENERAL PATHOLOGY—CONTINUED.

Structural Diseases continued: Morbid Growths; Definition and Classification. I. Non-Malignant Growths,—Cysts,—Non-malignant Organised Tumors. II. Malignant Growths,—Species: 1, Scirrhus—Carcinomatous Carcinoma, or Stone Cancer. 2, Medullary Carcinoma—Fungus Hæmatodes, or Soft Cancer. 3, Gelatinous Carcinoma—Colloid Cancer, or Soft Cancer; Peculiar Constituents of Cancerous Substance; Nature and Development of Cancer; Is Cancer Contagious? Exciting Causes; Liability of Different Structures, Sexes and Ages; Symptoms, Local and Constitutional; Therapeutic Measures. III. Parasitic Animals—Entozoa.

MORBID GROWTHS.

Definition and Classification.—By morbid growths are meant certain structures which are developed in connection with living animal tissues, but differ from them in their mode of growth and peculiarity of structure. They differ also from the cacoplastic and aplastic deposits which we have been considering, by a much higher degree of vitality, and by the property of self-nutrition. They are not the results of abortive organization, but are specimens of nutrition so far perverted as to produce a living structure, dissimilar to that which should have been developed, and which has no normal relation to any part of the animal organism.

The most convenient classification of these growths, is that which arranges them under the three heads of: *I. Non-malignant Growths. II. Malignant Growths, and III. Parasitic Animals or Entozoa.*

I. NON-MALIGNANT GROWTHS.

This class embraces such morbid growths as exhibit an organization somewhat resembling that of some normal tissue of the body, and which, while they derive their nutriment from the blood, do not grow by the destruction of the natural structures, nor multiply by the production of similar growths in other parts of the body. It is for these reasons that they are called non-malignant. The

mischievous they do arises from the pressure they exert on adjacent tissues or organs, producing atrophy and interruption of functions, and from their appropriating to themselves the nutrient elements of the blood required for the support of the body. Growths of this class may be subdivided into *cysts* and *organized tumors*.

Cysts.—These must be distinguished from enlargements of natural cavities by the accumulation of fluid or solid substances, which sometimes occur as the result of disease or of obstruction to excretory ducts or outlets. Thus the Graafian vesicles in the ovaries, the calices of the kidneys, synovial bursæ, the mucous follicles of the cervix uteri, the cutaneous follicles, etc., sometimes become expanded to large dimensions by the retention and accumulation of their own secretions or of morbid deposits. Cysts are frequently found in the kidneys and liver, and sometimes in other glandular structures, which do not appear to be new growths, but to consist of portions of excretory ducts which having become obstructed, are afterward distended with serum or the natural secretion of the gland. The tumor that occasionally appears under the tongue, called *ranula*, is caused by obstruction in the salivary duct.

The morbid growths that properly belong to the subject now before us, are closed, membranous sacs, bearing some resemblance in appearance and structure to serous membranes, secreting a fluid from their inner surface, and connected externally with the surrounding tissues. According to Vogel the secretion is effected by the development of epithelial cells. Their contents vary greatly both in consistence and nature. Sometimes they are filled with limpid serum; sometimes the serum is thickened by epithelium scales. In other instances their contents are solid or semi-solid, and consist of blood, or of oily, mucoid, or puruloid matters, more or less solidified. This diversity has given rise to different names that serve to designate the character of the matter found within the cavities of the cysts. Thus we have *serous cysts* containing a watery fluid; *melicerous cysts* filled with a substance of the consistence of honey; *steatomatous cysts* when the contained substance resembles fat; and *atheromatous cysts* when it is curdy or pultaceous, like concrete pus.

The same patient may have but a single cyst or a great number. Where there are more than one, they may be located in different parts or several may be grouped together. In size they vary as much as in any other circumstance; some being so minute as to be

barely visible, others as large as a man's head. Their walls sometimes undergo degeneration by the deposition of cartilaginous, or osseous matters. Sometimes inflammation attacks them, and its products, as lymph, blood, or pus, may then become mixed with the previous contents. The cartilages and perhaps the bones are the only structures of the body in which they do not occasionally occur.

The origin of cysts is obscure, though it is doubtless connected with a perversion of nutrition. Their formation is not necessarily preceded by inflammation or any other observable disease. One hypothesis assigns their development to changes in extravasated blood or lymph, of which the exterior becomes organized into a secreting membrane, and the interior is more or less removed, and its place filled with serum, which may itself be thickened by epithelium scales, or converted into fatty or puruloid matter. Another theory attributes the production of a cyst to some inexplicable change in the vital action of one of the microscopic cell-germs which form the basis of animal tissues, which change results in the formation of a new body, bearing some resemblance to areolar or serous tissue, but governed by laws of its own. It is probable that these growths have different modes of origin in different cases.

The secreting membranes of these bodies are capable of indefinite expansion as the secreted matter accumulates, but they never convert adjacent structures into their own, as do malignant growths. As has been already said of non-malignant growths generally, they do mischief by pressing upon neighboring structures, causing atrophy of tissues and embarrassing organic functions, and when they are numerous or large and grow rapidly, they rob the blood of its nutrient constituents and in this way cause general emaciation. Sometimes they become over-distended and burst, and produce dangerous effects by the effusion of their contents. The inflammation which they sometimes undergo is another source of danger that attaches to their presence in the system.

The cause of their formation is even more obscure than their mode of development. They appear sometimes to have an origin entirely local; in other cases their occurrence in several organs, simultaneously or in quick succession, seems to point to some constitutional derangement, as causing or favoring their development.

Non-malignant Organized Tumors.—The structure of non-malignant organized tumors is various. When it is composed of a soft vascular substance resembling flesh, it is called *vascular sarcoma*; when it has a fatty character it is designated as *adipose sarcoma*;

when fibro-cartilaginous, it is denominated *chondroma*, and an osseous morbid growth is styled *osteo-sarcoma*. In Cullen's nosology, polypus is classed as a species of sarcoma, and some polypous growths evidently belong to this class.

The *cause and mode of development* of this kind of tumor are involved in as much obscurity as those of cysts. They probably originate in a manner somewhat similar, and owe their different organization to some peculiarity in the perverted action that produces them. They are indeed sometimes invested by a cyst-like membrane, in which case the contents probably result from an organization of its secretion. In other cases they appear to be the result of cell-growth, analogous to that by which normal tissues are developed, the cells being endowed with vitality and the power of propagation. It is probable that they sometimes have their origin in the effusion of coagulable lymph, as they sometimes make their appearance in parts that have suffered from inflammation, but their formation is not generally preceded by any observable symptoms of disease.

Their effects in the system are mostly mechanical like those mentioned as caused by cysts. When they occur on the surface or within reach, they require the hand of a surgeon. When internal, little if any thing can be done for them, as they are seldom much affected by the administration of medicine. They sometimes degenerate into a malignant character.

II—MALIGNANT GROWTHS—CARCINOMA OR CANCER.

I can not in this place enter into a minute description of the different varieties of *cancer* or *carcinoma*. This would occupy more time than I have at my disposal, especially as the treatment of tumors pertains more specially to the chair of surgery, and their peculiarities do not throw much light on the subject of medical treatment. Three species of carcinoma are generally described, viz :

1. *Scirrhus—Carcinomatous Sarcoma—Stone Cancer*.—Scirrhus is a very dense growth, creaks under the knife, and when touched with the fingers feels somewhat like stone. The substance is hard, semi-transparent, varying in color, being in some instances whitish, in others gray, and in others having a bluish-white or pearl-like hue. When cut the surface is shining, and the structure generally contains bands of white or yellowish fibers which intersect each other in various directions. Sometimes the substance bears considerable resemblance to boiled pork,' and this variety

has been styled *lardaceous* carcinoma. When the scirrhus is distinctly lobulated like the pancreas it is sometimes called *pancreatic* carcinoma.

Scirrhus contains very few blood-vessels, usually grows slowly, seldom becomes larger than an orange, is apt to be attended with lancinating pains, and often contracts adhesions to adjacent structures. The last-mentioned circumstance causes contraction of the structures around the cancer, and when the skin is involved, it shrinks and conforms to the surface of the scirrhus growth. This is one of the diagnostic features of this variety of cancer. When the substance is softened it forms a jelly-like semi-transparent matter, of yellowish-brown color. Its most frequent seat is the breast, though any of the glandular structures are liable to it. It is said to attack the secreting glands more frequently than the excreting or the lymphatic. It is much more frequent in adults than in children, and the liability greatly increases at middle life.

2. *Medullary Carcinoma*—*Fungus Hæmatodes*—*Soft Cancer, etc.*—In this variety there is a predominance of the cancer-cells, instead of the fibrous structure of scirrhus. Its substance is softish, opaque, and of dull-white color, and bears some resemblance to the brain both in consistence and lobulated appearance. It is this character that has led the French writers to designate it by the terms *encephaloid* and *cerebriform*. This variety differs from scirrhus not only in density but in containing many minute blood-vessels, which being easily ruptured, are often the source of hemorrhage. This gives the substance the bloody appearance expressed by the name of *fungus hæmatodes*. Other varieties of cancerous substance are occasionally met with, as the *mammary sarcoma* where it resembles the boiled udder of a cow, *solanoid carcinoma* where it resembles the potato, etc.

The growth of soft cancer is often very rapid, requiring in some cases only a few weeks to reach its full size, which is sometimes enormous. Its growth after ulceration is usually accelerated. It does not often cause contractions by adhesions with surrounding structures, but keeps them distended by its rapid expansion, and destroys the skin that rests upon it by producing ulceration. When softened its appearance is white, opaque, and cream-like.

Medullary cancer attacks every variety of tissue, and often exists in several parts of the body at the same time. It often appears as a secondary attack after scirrhus cancer has been removed. It is said to occur more frequently in childhood than after puberty.

3. *Gelatinous Carcinoma—Colloid Cancer—Gum Cancer, etc.*—The substance of this variety is soft when removed from the tissues in which it grows, although the tumor it causes is quite firm. It is a transparent, jelly-like matter, varying greatly in color, being yellowish, greenish-yellow, grayish, brownish or reddish in its hue. The matter is contained in loculi or cysts of various sizes, which are developed among the tissues of the part in which the cancer is seated. This matter may constitute the entire mass of cancerous substance, or form only a part of a cancer, in which case the tumor has a compound character. Its most frequent seats are the pyloric orifice of the stomach, the omentum and the intestines, though it sometimes occurs in the bones, testes and mammæ. It does not often occur in childhood.

According to Lebert tumors of a gelatinous kind and resembling carcinoma sometimes occur, that contain no cancer-cells, and J. M. Arnott, F. R. S., in 1856, presented a paper to the Royal Medical and Chirurgical Society, London, in which after "having given a minute account of the mode of origin and development of colloid, with an examination of the question as to its relation to and association with cancer and tubercle, the author drew the conclusion, that, as far as could be judged from the cases detailed by him, colloid was a disease perfectly *sui generis*, neither of a cancerous nature, nor frequently associated with cancer, and concluded with advocating the propriety of the early removal of the disease when practicable, inasmuch as, if not radically cured by operation, there was abundant evidence that colloid was slow to return after excision."—*London Lancet*, August, 1856.

Peculiar Constituents of Cancerous Substance.—From what has been said you perceive that there is much variety in the appearance, physical properties and intrinsic structure of cancerous growths. All of them, however, except the colloid contain an element which is characteristic of the disease. This is the "cancerous juice" that exudes from the structure when subjected to pressure. In the scirrhus variety it is best obtained by scraping the cut surface with a knife, as very little is obtained by pressure. Its color is usually a pale yellowish-white, but varied occasionally to yellow, red or black from admixture of fat, blood or black pigment.

The ingredients of cancerous tumors generally, when examined under the microscope are, 1, Fibrous tissue, 2, The viscid liquid just mentioned, and 3, "Cancer-cells" in different stages of growth. They all contain blood-vessels, but in some they are

very scanty. Nerves and absorbents have not been detected, though the painful symptoms seem to indicate the existence of nerves at least.

The most interesting constituent of cancerous matter as connected with diagnosis are the cancer-cells. They have no determinate form but are spheroid, ovoid, irregularly polyhedral, and often have caudate prolongations, causing them to be club-shaped, spindle-shaped or bifurcated. Their average size is about $\frac{1}{1300}$ of an inch, and they contain a nucleus as large or larger than a pus-globule. The nucleus is nucleolated. The cancer-cell sometimes contains several nuclei and even young cells in different stages of development. Such cells are often double the average size and are called parent cells. Free nuclei of an oval or spheroidal shape may also be seen floating in the fluid. For further descriptions of the cancerous matter I refer you to the microscopic works.

Nature and Development of Cancer.—So obscure is this part of the subject that it has long formed a fruitful theme for discussion among the advocates of different hypotheses. Some contend that it has always a local origin and that the system becomes contaminated, if at all, by the cancerous elements entering the circulation from the local disease. If this theory could be established it would remain for us to ascertain some cause for the local origin. Is it a parasite? Why do not such parasites fasten upon all persons indiscriminately? Is it caused by local injury? What kind of injury tends to produce cancer, or will the same thing originate cancer in one person and non-malignant disease in another? If so, there must be some peculiarity of tissue or of blood that causes the result in the one case to differ from that in the other.

If on the other hand we conclude that there is a cancerous diathesis, a state of the system that predisposes to the development of cancerous growths, the question arises wherein does this peculiarity of system consist? Dr. Carswell asserts that cancerous matter is sometimes found in the veins when no carcinomatous disease can be found in any of the structures. Other writers after extensive researches have entirely failed to confirm Dr. Carswell's assertion. Cancer-cells are often found in the blood of patients who have cancer, especially the medullary variety, but Lebert asserts that they are never found floating loosely, but are always connected with excrescences attached to the inner surface of the veins or else involved in coagulated blood near the seat of the cancer. In the former case they are probably developed within

the vessels, in the latter they most likely enter through openings caused by the local disease. If, then, the tendency to cancerous disease arises from some peculiarity of the blood, that peculiarity must consist either in the existence in that fluid of invisible cancer-germs, the presence of which can not be detected in ordinary states of the system, or it must depend on a peculiar chemical character of some of the constituents of the blood. I am persuaded that the latter hypothesis is near the truth.

Is Cancer Contagious? This is a question that has not yet been decided. It is said the disease has occurred on the glans penis after contact with a cancerous os uteri, and Languebeck made an experiment "which was supposed to have proved that cancerous pulp containing cells is capable of communicating the disease to animals on being injected into their veins, but the attempt to effect this purpose has since been frequently made by other pathologists without a like result."—*Williams*. Contagion is, certainly, not a common cause of cancer, and it is very doubtful whether the disease can be produced in a constitution not in some way predisposed to it.

I believe carcinoma to be the result of a perversion of nutrition, and that it depends upon some peculiarity in the vital properties of the common tissue-developing cell-germs which causes them under exciting causes to take on a new mode of development. The perversion, instead of being manifested in a failure of organization, or a degradation of vitality, as in tubercle, consists in mal-organization of the cells and peculiarity of vital properties in them. Instead of being transformed into tissue, which is the natural tendency of normal cells under the vital principle with which they are endowed, the perverted cells expend their vital force in the function of reproduction and multiplication. They attain a large growth as cells, produce other cells of the same kind, but never form tissue by becoming transformed and attached together. The nutritive function in cancer loses none of its energy, but is manifested in a wrong way.

The *exciting causes* of cancerous growths appear to be such as keep up a state of local irritation for a long time. Thus the scrotum of chimney-sweepers is a frequent seat of cancer, probably from the constant irritation caused by the soot being allowed to remain and accumulate on that part. The lips of persons accustomed to the constant use of the tobacco-pipe are frequently attacked, owing to the pressure and irritation produced by the

pipe-stem. Dyspeptic irritation of the stomach is sometimes followed by cancer of that organ. Long-continued pressure upon the mammary gland, as from tight clothing, as well as other causes of irritation, seem to favor the development of cancer in that organ. But many cases occur in different parts of the body in which no local cause is known to have operated. It is certain, also, that the causes just enumerated do not, in a large majority of cases in which they are present, produce the disease. It appears, therefore, that there must be a predisposition to carcinomatous disease before any known exciting cause will develop it, and that where the predisposition is strong, very slight circumstances may be sufficient to produce the local manifestation of the malady.

Liability of Different Structures, Sexes and Ages.—Although all the structures of the body are liable to be affected with cancer, some are more so than others. The mammæ, the uterus, the stomach, and the testes, are most frequently its seat. The cellular tissue is said to be more frequently attacked than the other textures, though the skin and mucous membranes are often, and the muscles and bones occasionally affected by the disease. It does not often occur in the proper fibrous tissues or cartilages. The veins are much more liable to cancerous disease than the arteries. It does not often occur in the same organ on both sides of the body at the same time. Females are oftener attacked than males, and in both it occurs most frequently between the ages of 40 and 50, when certain constitutional changes probably occur in both sexes—certainly in the female, as evinced by a cessation of the menses. Women are said to be more liable than men in the ratio of three to one. When it occurs in early life it most frequently attacks the lymphatic glands, the cellular tissue, or the large joints.

The *symptoms* of carcinoma depend of course upon the variety, so far as regards appearance and consistency. It is not always attended with pain, especially in the early part of its progress. When there is pain it is apt to be sharp and lancinating. When ulceration attacks adjacent tissues the suffering increases, and is often very severe, though to the last there are generally intermissions of the pain.

The effects of cancerous disease on the system are manifested by a wan, sallow paleness, a sad expression of the countenance, disordered digestion, weakness, emaciation; in short, by a cachectic condition. In a fatal case the patient either sinks under the exhaustion caused by pain, irritation, wasting discharge,

sloughing, etc., or by the failure of function in some vital organ. This latter result may be produced by the disease involving the structure of the organ, by interfering with its function mechanically, as by pressure, or by interrupting its connection with other organs upon which its function depends.

The *therapeutic measures* for carcinoma are surgical and medicinal. Of the surgical measures you will not of course expect me to speak, and in regard to medical treatment I know of no specific. The aim must be to support the strength, improve the blood, and increase the constitutional vigor. Perhaps it might not be amiss to read to you an article which I find in the London Lancet, July, 1857, written by Wheedon Cook, Esq., M. R. C. S., especially as his views very nearly coincide with those I have long entertained in regard to the nature and treatment of cancer:—

“The subject of my communication is one that has been the philosopher’s stone of medical men of all ages; the battle-ground between the regular practitioner and the empiric; the shuttlecock of nostrums and theories as opposed and outrageous as they have proved useless or hurtful; the nidus in and on which mystery, superstition, charlantry and all kinds of deceit have battened, to the unfortunate delay of those yearnings after the truth which now most happily distinguish the hard-working and hard-thinking medical explorers of the present time. Miracles are not wrought now, although the great public still hankers after them in matters medical, and swallows greedily any boldly-put-forth tinsel imitations, while the calm, progressive results of inductive thought, of reason guided by experience and knowledge, fail to secure the attention they deserve. Persistence, however, in the path of duty will, I am persuaded, ultimately and at no distant period obtain a mastery over even this disease. In order to arrive at this supreme good, I am emboldened to assert that we must go back to the times of Hippocrates and Celsus, and learn from them that no operation, whether by knife or caustic, will eradicate the disease; that we must admit at the outset the truth of the axiom of Euclid — ‘The whole is equal to its parts;’ or, as the principle is still better expressed, ‘*ominus major continet in se minus*,’ ere we can go to work at all scientifically or rationally to investigate this malady.

“Six years ago, by my appointment to the Cancer Hospital, I was enabled to devote myself to the special study of this disease. At the onset I found myself impressed with the established scholastic rule, that the scalpel was the remedy for cancer, and that, if

that were inadmissible, the patient must be left alone, or at the most be propitiated by sedatives. Some years of observation, upon upward of a thousand cases, have passed over, and the conviction has been gradually forced upon me that the local manifestation of the malady deserves only a secondary consideration in the treatment: the whole system being at fault, remedies must be directed to the larger point of attack. Although of late years Velpeau and our own surgical schools have urged the necessity for local eradication, this teaching differed much from the instructions of the previous generation of surgeons, and the names of Sir Astley Cooper, Monroe, Carmichael, Abernethy and Samuel Cooper, may be quoted in favor of a constitutional treatment. 'He who looks at this disease in the light merely of a local affection,' says Sir A. Cooper, 'takes but a narrow view of it.' That indefatigable pathologist, Dr. Carswell, also proclaims cancer a constitutional disease; while abroad, Scarpa, Cruveilhier, Boyer, Broca, Lebert and a host of German writers, corroborate this opinion, and all who believe in a special cancer-cell must of necessity adhere to the same.

"Beyond and apart from all speculative and theoretical opinions, there are certain undoubted facts, which those who are seeking after truth only can not but accept as proofs of the systemic origin of the disease.

"There is, 1st, the almost invariable return of the disease after extirpation at an earlier or later period.

"2d. An hereditary disposition is shown in a certain number of patients.

"3d. The evolution of the disease at a time when important changes are occurring in the circulatory system.

"4th. The undoubted effect of depressing moral agents in originating the malady.

"And lastly, the evidence of numerous deposits of cancerous matter in many parts of the body, as seen during life, but more frequently found in the viscera after death.

"In illustration of the first proposition — the return after operation — it appears that 128 persons have presented themselves at the Cancer Hospital who had been operated on, and the average duration of their freedom from any external sign of the disease was eighteen months. Some prominent cases have come under my care, the particulars of which must be omitted for want of space. Mayo operated on 100 cases, and considered that five only had been permanently benefited; Boyer admits of four cures only in the

same number; and Macfarlane, who had operated on 118 persons, could not point to a single radical cure.

"This second proposition — i.e., hereditary taint, must of course if proved, go far to establish the constitutional origin. Velpeau says one in three have this predisposition; at the Cancer Hospital it has only been noted in one in six; and by Lebert, in one in twelve cases. This forms at least a link in the chain of evidence.

"Third proposition: Cancer in its various forms, is seen at the commencement and at the end of our allotted days; but in the great bulk of cases from forty-five to fifty is the usual period of its development. According to a calculation made by myself in upward of 1000 cases, the average age is forty-three years and a quarter. This climacteric period of life is obnoxious to the most remarkable changes in both sexes. Many instances of these changes in man are recorded by Sir H. Halford; and the physiological reasons for them are amply ventilated by Dr. Roget. But while the male is not exempted from alterations of structure and impairments of function at the turning point of life, it is the female who especially suffers at this period, from the cessation of that menstrual flow which was wont to assist so much in carrying off the effete matters of the system. This extra source of deterioration of the vital fluid accounts for the wide difference in the number of the two sexes afflicted with this malady. At the Cancer Hospital, the female patients are as six to one male. If the disease were a local one, why so constantly select this particular period of life for its manifestation? Some believing in the constitutional origin, insist upon a local exciting cause to set up the action; but this even is scarcely supported by facts, inasmuch as one in seven only of the 1000 patients referred to knew of or suspected any direct violence to the part affected.

"The effect of depressing moral agents has been noted by most authors, but rejected by some. Sir A. Cooper says, 'three-fourths of these cases arise from grief and anxiety of mind;' and my experience confirms this opinion. Material alterations in the blood are brought about under these circumstances. Atrophy of the red corpuscles, and increase of the colorless globules, may be observed; and thus the creative power of the blood is deteriorated, and the tissues which this ill-elaborated fluid forms, show that defective organization which is seen in cancer. Whether the defect be a process of exudation or of impaired nutrition is a speculation difficult of solution, but I am inclined to the idea of deranged nutrition

or degeneration of the tissues similar to the fatty degeneration now so fully recognized.

“Finally the distribution of the disease through the various structures of the body, together with another piece of evidence—viz: the impossibility of conveying cancer by inoculation, would seem to prove, by an accumulation of facts, the affirmative of the proposition that cancer is from within, that it has its origin from the center, and that consequently any measures directed to the periphery only must of necessity be unphilosophical and ineffectual.

“The constitutional origin of cancer being established, it becomes necessary to apply to this principle, the actual test of practical experience founded on the observation of the course which Nature pursues when left to herself, and of the course and termination of the disease when Art endeavors to relieve it; and to prove not the necessity for abstaining altogether from the scalpel and the caustic, but that the blood, and bones, and muscles, and all that goes to make up the animal frame, require to be azotized, to be built up, to be so invigorated by physical, but perhaps almost no less by moral agencies, that it shall be impossible for this defective growth to go on. The whole being thus cared for, its part or parts (the local manifestation of the disease) may be usefully attacked. There are means to be referred to presently of assisting in the production of atrophy of the tumor from without, and there are cases in which hemorrhage or excessive purulent discharge are so weakening the patient, that it becomes necessary either by the knife or caustic, but far preferably by the former, under the blessed influence of chloroform, to remove this source of decay.

“In a very large number of cases there is a period when the cancerous tumor ceases to increase, begins to diminish, and gradually to waste away; so that the prolongation of life is not in any way affected by the patient having been subject to this malady. This spontaneous cure of the disease has been noticed by Velpeau, as well as by Sir A. Cooper and other authors, and several cases of cure by atrophy could be recited from among the patients at the Cancer Hospital. If the *vis medicatrix naturæ* is sufficient even in a few cases to check the disease, may we not fairly expect that some of the means which we possess so abundantly for encouraging a healthful condition of the solids and fluids of the body shall be effective in the assistance of the vital powers to stop the further growth of the fungus. All medicines or dietaries of a lowering

description, I utterly repudiate, and even the iodide of potassium, which Velpeau says cured three cases of cancer, I have little inclination to employ, unless in combination with iron or some other tonic to counteract its depressing tendency. All the soporifics should be objected to, as adding to the dyscrasia, and when from the entreaties of patients, it becomes necessary to have recourse to them, all hope of remedy must be put aside. Arsenic has formed the basis of most of the secret remedies which at regular intervals sweep over society, exciting all the superstitious reverence which more or less lurks in every breast, and has brought for a short period great grist to the magician's pouch; but according to my experience, its usefulness, either internally or externally, does not compare to other more certain and less dangerous tonics and escharotics. Of all the medicaments which experience or theory has shown to influence this disease, iron in its various forms is capable of effecting the largest amount of benefit. In order to obtain this good in various constitutions, it is necessary to vary the form of its administration, and then to alternate this tonic with others. The mineral acids are most valuable, either alone, or in combination with other drugs. A mixture of lemon-juice and sarsaparilla is for delicate people a most excellent appetizer. Bark in the form of the compound tincture is largely used with the greatest benefit at the Cancer Hospital, and cod-liver oil, as an adjuvant to other remedies is serviceable.

“Diet and moral management are of the utmost moment in the conduct of these cases. It would be impossible to lay down dietetic rules applicable to every case, since each person has his peculiarities, and must be managed in accordance with them; but it will be well to say that the system requires to be amply nourished and somewhat stimulated; that good meat, good beer, and a fair supply of good vegetables—putting aside the nonsense of sloppy soups, and leuco-phlegmatic fish, to waste the appetite and distend the stomach, are the grand indications as far as the important matter of diet is concerned, and wine may be taken according to advice. The treatment of the mind is not less important, and if we could eradicate the idea of the incurability of cancer, we should do much toward its cure. Hope would assist our efforts at restoration more perhaps than any physical agent. The diversion of the mind from the contemplation of the malady by the influence of genial society—by the cultivation of literature and science, and by change of

scene in travel, has tended to the production of that atrophy of the disease, which is in fact its cure.

“A few words yet remain to be said respecting the local treatment of cancerous tumors. It appears from the statistics at the Cancer Hospital, that 128 persons have presented themselves, who had been operated on, previous to coming to the hospital, and that the average lapse of time before the return of the disease in these cases, was eighteen months. From this it may be assumed with tolerable justice that operations do not generally cure the disease. There are, however, some cases in which removal of the local malady is desirable as tending to prolong life or remove unsightliness. One instance is that of the advanced hemorrhagic stage of cancer which has already been referred to, and the other condition is where epithelial cancer attacks any exposed part, such as the lips, face or extremities. The method of removal in either of these cases should be by the knife, under the influence of chloroform, for as to the revival of the treatment by caustics, now that we have the invaluable assistance of chloroform, I can not imagine how such a necessarily prolonged and painful procedure can be recommended by the profession or tolerated by any patient who has the power to select the least of these two evils. *The knife can do without pain, in as many minutes, all that the caustic can do with pain in as many days.* These two agents, however, in the local treatment of cancer, are of infinitely less importance than those which assist in the induction of that atrophy of the tumor which Nature brings about in many cases, from mere *proprio motu*, and which Art may assist in promoting in many more. Of all the detergent remedies, lead in its various pharmacopœial forms is the most efficacious. The liquor plumbi, alone or diluted; the lead cerate, and the soap cerate which contains lead; the iodide of lead ointment, and the lead plaster, with or without adhesive plaster, are all at different stages of the disease, most invaluable adjuvants to the general constitutional treatment. It would be tiresome to enter into details of special applications for particular parts of the system, such as the chlorate of potash, and hydrochloric acid lotion, and carrot poultice, to the ulcerated or sloughing breast; the borax lotion, and the application of the nitric acid or sulphate of copper to the tongue, etc. These are matters which practice teaches, and which may sometimes, perhaps be varied with advantage, according to the taste or fancy of the surgeon, provided that the great principle be at all times kept

in view, namely, that the local treatment in cancer, whether by the knife or caustic, or detergent applications, is and must be second in importance to the general upholding and revivifying of the constitutional powers."

The removal of cancerous growths by means of caustic applications has recently received more attention from the profession than formerly, though it has long been the hobby of a class of charlatans known as "cancer doctors." The following condensation of a report which lately appeared in the London Lancet, may be found in the American Journal of the Medical Sciences for April, 1857. The treatment detailed does not appear to me to differ in any material point from that which has been employed by Eclectic practitioners in this country for a number of years. We formerly used the sulphate of zinc, but for some two or three years past the chloride has been preferred, at least by most of us. I do not of course advise the use of the iodide of arsenic.

"Chloride of Zinc in the Treatment of Cancer.—Dr. Edward S. Haviland, who has been engaged for some time past in the treatment of cancer by the process of enucleation, under the use of chloride of zinc—an escharotic long known to the profession—gives (Lancet, Feb. 14, 1857) the following brief result of his experience with his mode of preparing and employing the article:

"The caustic chloride of zinc is prepared 'by making it into a thick paste with any absorbent powder, such as gypsum, flour, starch, or the powder of althæa, or gum acacia; and I find the proportions necessary are either equal parts of the chloride and powder, two or even three of the former to one of the latter; or, what I prefer is, a mucilage of the purest gum arabic, made as thick as possible, or sufficiently viscid and glutinous to prevent its running, as, on account of the highly deliquescent nature of the chloride of zinc, it is apt to run over the sound and healthy skin, which it destroys almost with equal facility as the diseased structure, though a contrary opinion prevails. The preparation may be colored with any vegetable coloring matter, which permeates into the subjacent tissue, indicating the depth which each dressing has penetrated, and materially facilitates the operations of the surgeon.

"Next comes the mode of employing the remedy, which will slightly vary according to whether the skin is unbroken or not. When the skin is entire, having marked out the extent of the disease, apply either the acid nitrate of mercury or strong nitric acid, so as to completely destroy it over the whole surface, in order

that the caustic may act more speedily, and after the heat and pain attending the destruction of the part has subsided, next apply the dressing, spread on calico or lint, the shape and size required; and over the whole apply a portion of wadding or cotton wool, to protect it from cold and absorb any moisture occasioned by the running of the dressing. The parts around, and especially below, should be protected from the action of the caustic, by a thickly-spread dressing of spermaceti ointment, holding as much chloroform mixed in it as it will take up, which will at the same time tend to allay the burning and pain during the action of the escharotic. Sedatives may be given with the same object, such as pills composed of opium, the compound soap-pill, or Battley's solution; the state of the system being attended to, and the patient encouraged to take a generous diet, with wine and malt liquor after the first few days. At the same time, the constitution should be improved by administering cod-liver oil, and the different preparations of steel and quinine, especially the iodide of iron; and the iodide of arsenic may be given in combination with hemlock, with a view, if possible, to alter the cancerous diathesis. The following day a whitish eschar will be seen, through which incisions to the depth of the part destroyed should be made vertically through the tumor, and dressings spread on narrow strips of lint or calico should be carried to the bottom, and the same should be continued daily until the whole is destroyed, which will be in twelve or fourteen days, after which the dressings may be discontinued. The tumor will thus be enucleated in about thirty days from the commencement, leaving a granulating healthy surface, which will heal most rapidly with the ordinary resin dressing or the dry cotton wadding.

“In case of an ulcerated or open cancer, the dressing may be applied at once, spread on calico or lint, the shape and size of the sore, which may afterward be treated with incisions in the same way as that where the skin was intact.

“Having made these general remarks I will now conclude by giving a short history of one of my cases in illustration of this mode of treatment:—

“Mrs. D——, aged forty-eight, and the mother of ten children, a spare, thin, and emaciated person, has a hard, circumscribed tumor in the right breast, with considerable surrounding infiltration, having all the characteristics of confirmed scirrhus, free from attachment, and nipple not retracted; feels sharp, darting, and

lancinating pains shooting through the tumor, extending to the glands in the axilla, which are much enlarged. A small hard swelling was first perceived about eight years since, the origin of which she attributes to a blow. Until two years ago the enlargement was very trifling, when the catamenia ceased, but since then it has increased most rapidly, and the pain, which was at first very inconsiderable, has been much more severe in its character. The health is very materially impaired, though no very strongly-marked cancerous cachexia is observable in her countenance. There is no hereditary predisposition; but she has lost a sister by consumption.

“*Dec. 3, 1856.* Commenced to destroy the skin over the full extent of the surface of the tumor by the application of strong nitric acid, the heat and pain of which having subsided, I next applied the escharotic, prepared and spread on linen (as described) over the part to the extent of which I had destroyed the skin, over which I placed a portion of cotton wool, and left it until the following day, prescribing one grain of opium every four hours to allay the pain, and to commence with one pill three times a day, composed of one grain of iodide of arsenic; twelve grains of sulphate of quinine; twenty-four grains of extract of hemlock: mix, and divide into twelve pills.

“*4th.* The skin over the tumor where the acid and dressing had been applied being perfectly destroyed, I made several vertical incisions from above, or the top part of the tumor, to the bottom, merely through the skin, as deep as the deadened part, when narrow strips of linen, spread with the dressings,* were pressed down by means of a probe, to the bottom of the same. On account of her excessive debility and exhaustion, cod-liver oil was ordered, together with some steel medicine, with full meat diet, wine, and porter.

“*5th.* The incisions were deepened, and the dressings applied as before. This was repeated daily till the

“*17th.* When I found I had reached to the bottom of the diseased structure, from which time they were discontinued. The line of demarcation between the dead and the living part was now very perceptible, and it afterward became gradually more defined, until the entire separation around the tumor took place.

“*Jan. 4, 1857.* The thirty-second day after the commencement of the treatment, the tumor was enucleated entire, weighing at

* In this instance the preparation was made in the proportion of two parts of the chloride of zinc to one part of mucilage.

least a pound and a quarter, during a part of which time she suffered severely from influenza and bronchitis, which greatly retarded its progress. On the detachment of the tumor, a healthy granulating surface presented itself, which has since continued to heal most rapidly under the use of the ordinary resin dressing, and at the same time her health has most remarkably improved.'"

III. PARASITIC ANIMALS—ENTOZOA.

These grow in the body without forming any attachments to its structures, have an independent life of their own and possess the power of reproduction or generation. There are several species that occasionally infest the human body, some of them always appearing in the same organ, and others seeming to affect a particular tissue, and appearing oftenest where that tissue is most plentiful. Almost every portion of the body serves occasionally as the seat of such growths.

There are two hypotheses in relation to their origin upon which pathologists are divided. One of these theories regards them as races of living beings that are produced by generation exclusively, each creature deriving its being from an ovum produced by a preceding individual of the same species; the other refers their origin to the accidental or spontaneous development of germs that take on the modes of life and development that afterward characterize them. Analogy seems to favor the first mentioned hypothesis, but there are difficulties in the way of adopting either of them, and I should regard it as a waste of time to enter here into an examination of the subject, as it is certain that no satisfactory conclusion can be reached in the present state of our knowledge.

The chief interest that attaches to the existence of these creatures in the body, grows out of their effects upon the system. Their presence in a practical point of view is to be regarded rather as a cause of disease than as evidence of a pathological condition. Still it is evident that a certain state of the system favors their development, and whatever circumstance tends to bring it into such a state may be regarded as a cause of their production. Observation seems to authorize the opinion that an enervated condition of the body such as may be brought on by living in a warm, damp atmosphere, and the use of improper diet is most frequently the occasion of their appearance. Their existence is certainly apt to be attended by a cachectic condition of the system, but whether this is always an effect or sometimes a cause is not clearly determined.

The *symptoms* of their presence in the body are often very obscure. Their effects upon the system so nearly resemble those of irritating influences generally, that we are sometimes apt to think of a large circle of causes before the idea of parasites is suggested. When their abode is near the surface so that they may be felt through the integuments, or especially when they escape from the body so that they may be seen, the obscurity of the case is cleared up at once.

The mischief they do in the system depends upon the number, size, rapidity of growth, and species. When very numerous, or large, they imbibe so much of the nutriment necessary to the support of the system as to undermine its strength. The pressure they exert upon tissues during their growth sometimes causes local atrophy. Their presence is generally attended with more or less irritation let their habitation be what part of the body it may, and sometimes gives rise to inflammation. Their irritating effects are however more prominent when they are located in some of the cavities, and when they possess the power of motion. In the solid structures they are apt to be surrounded by a barrier of condensed cellular tissue which serves to protect the tissues from their irritating effects.

Several classes of parasites are described in the books. A brief reference to some of the more prominent species will occupy all the time I can now appropriate to them.

1. *Hydatids*.—*Psychodiaris*. The hydatid is “an organized being, consisting of a globular bag, which is composed of condensed albuminous matter, of a laminated texture, and containing a limpid, colorless fluid, with a little albuminous, and a greater proportion of gelatinous substance.” The hydatid possesses no sensibility nor power of motion, lives by imbibition, and although resembling an animal in substance, appears to be more like a vegetable in its mode of life and reproduction.

There are two kinds of hydatids, the *acephalocyst*, or cyst without a head, and the *echinococcus*, which differs from the other, not in form, but in containing animalcules within it—*vermiculi echinococci*, which entirely differ from the hydatid in character.

The *acephalocystis endogena* or common hydatid of the human body generates germs between the layers of its membrane. These are developed like buds upon its inner surface, from which they fall into its cavity. In this way the original cyst will sometimes come to contain an immense number of young hydatids. The

usual abode of hydatids is in the parenchymatous organs, as the liver, lungs, ovaries, spleen, kidneys, etc.

2. *Sterelmintha*.—"These consist of a solid parenchymatous texture, in which are excavated, as it were, the canals or cavities which serve the purposes of digestion. They have no separate tegumentary system. They have but one opening to the alimentary canal, and the sexes are placed upon the same individual." This forms the second class in Owen's arrangement, and is divided into several genera, among which are the animalcule of echinococcus, and the *tænia* and *bothriocephalus*, varieties of tape-worm. Another is the *cysticercus*, which occurs in muscular structure, and has been found in the aqueous humor of the eye, and in the brain. Its body is nearly cylindrical, ends in a caudal vesicle, has a slender neck and small roundish head. The head is crowned with one or two rows of small hooks curved backward, by means of which it is able to attach itself to a soft surface, and it is provided with four mouths or suckers through which it receives its nourishment. The *distoma hepaticum*, or liver-fluke rarely occurs in man. It is supposed to cause the disease called "rot" in sheep.

3. *Cælemintha*.—This class has a higher organic development than either of the preceding. It embraces several genera of worms, having hollow cylindrical bodies, a distinct alimentary canal, with a mouth at one extremity and an anus at the other, a nervous system and the sexual organs on separate animals. The *tricocephalus* and the *ascaris* are varieties of intestinal worms which belong to this class. The *trichina spiralis* is found in the muscles, sometimes in great numbers, where it exists within minute, white, ovate cysts, which sometimes give the muscular tissue the appearance as if "thickly sprinkled with the eggs of some small insect." Sometimes two or three worms are coiled up in a cyst of from $\frac{3}{16}$ to $\frac{1}{4}$ of an inch in diameter. Their extreme minuteness may be judged from this circumstance. The *filaria medinensis*, guinea-worm or hair-worm, is developed beneath the skin, especially of the scrotum and lower extremities, produces itching or irritation at some point, which is followed by a vesicle or pustule. When this opens the worm's head appears, and by great care and patience it may then be withdrawn from its bed. If it break, the accident is followed by serious inflammation. Such at least is the account given by some travelers. The worm is principally if not entirely confined to Africa and Asia.

The *strongylus gigas* is a parasite that locates itself in the kidney

exclusively, and sometimes attains such an enormous size as to destroy the entire structure of the gland. Its body is cylindrical but tapers toward each end, is marked with circular striæ and two longitudinal depressions. It has an obtuse head with a circular mouth, around which may be seen six hemispherical papillæ. It is said to sometimes attain a length of three feet and a thickness of half an inch. Its presence in the kidney causes impairment of function, atrophy of the renal structure, and sometimes inflammation, with pain and bloody urine. The worm is sometimes expelled through the urinary channel.

The proper *treatment* of parasites has not been well settled. If within his reach the surgeon may remove them. If located in the alimentary canal they may be attacked with such remedies as are known to cause their expulsion. The indication is of course to bring such agents to bear upon them, whatever their locality may be, as are known to deprive them of life. Various agents are said to be poisonous to hydatids, as cherry-laurel water, camphor, volatile oil of cubebs, oil of turpentine, copaiba, acetic acid, etc., but it is difficult to introduce such agents into the system in sufficiently potent form to affect parasites which are imbedded in the solid structures. The application of electricity to the part where they are located is said to have proved successful in causing their death. But unless their position be such that when killed they will escape from the system, it is worthy of consideration whether their death, especially where they exist in great numbers or are very large, might not cause inflammation by reducing them to the condition of dead matter, and thus produce more injury than would have been caused by the living parasites.

The subject of intestinal worms will be considered in connection with special diseases.

LECTURE XIII.

ETIOLOGY, OR THE CAUSES OF DISEASE.

On Morbific Causes generally: Definition and General Remarks; Classification. Predispositions: I. Peculiarities of Constitutions; 1, Hereditary Tendencies, 2, Temperaments, 3, Idiosyncrasy, 4, Sex, 5, Age—Infancy—Childhood—Puberty—Termination of Growth—Adult Life—Old Age, 6, Effects of Previous Diseases; II. Debility; Causes, 1, Imperfect Nourishment, 2, Impure Air, 3, Excessive Exercise, 4, Want of Exercise, 5, Long-continued Exposure to Heat, 6, Long-continued Exposure to Cold, 7, Habitual Use of Intoxicating Drinks, 8, Depressing States of the Mind, 9, Waste of the Blood; III. Functional Excitement; IV. Existing Disease; V. Occupation and Modes of Life.

ON MORBIFIC CAUSES GENERALLY.

Definition and General Remarks.—Your attention is now invited to a consideration of the causes of disease. These consist of circumstances which produce such changes in the living organism as are manifested by derangement of function or alteration of structure. Disease may occur in the absence of any known cause, and then we are apt to attribute it to something which has preceded the morbid change. This often leads to error, for although the cause must of necessity precede the effect, it is by no means always safe to assign these relations to events that happen to succeed each other in the order of time. When the same morbid changes follow any particular circumstance with much uniformity, we are justified in some degree in regarding that circumstance as a cause of such changes. But here there is still much room for fallacy, for if our attention is directed to the mere fact that a given disease usually appears after the occurrence of a certain event, we may lose sight of other influences that are intimately associated with each case, and which it is equally important to take in the account. If we should observe that a large number of persons who eat cucumbers in the beginning of summer are attacked with vomiting and diarrhea, it might be safe to decide that eating the cucumbers was the cause of the disease in the cases observed, but it would not do to conclude

that this particular vegetable is a specific cause of cholera morbus, unless it could be shown that all other green vegetables may be eaten without producing similar effects. If upon examination we find that cabbages, beans, peas, and other similar articles are equally injurious, we may conclude that eating green vegetables causes cholera morbus, but it will be necessary to ascertain whether, if eaten later in the season, or in a different state of the atmosphere, they generally cause the same disease, or some different disorder, or none at all.

It is not sufficient therefore that a circumstance has, in even a large number of cases, been followed by a given disease, to set it down as the specific cause of that disease, and expect the same result to always succeed it. Under a change of circumstances you may discover that it has ceased to cause disease at all, or that it is followed by morbid symptoms of a very different character. So that, in studying the subject of causation in regard to disease, we should accustom ourselves to inquire into all the circumstances that cooperate with the more prominent apparent causes, both externally and in the system. In this way we may often arrive at the truth when a casual or superficial observer would be led into error.

Classification.—Several different modes of classifying morbid causes have been adopted by different writers. They were formerly divided into *remote* and *proximate* causes, but as what were then embraced under the second division are now regarded as elements of disease itself, and form the subjects of general pathology, this distinction must of course be laid aside. Several other terms are occasionally employed, each of which is expressive of some peculiarity in regard to certain groups of causes. Thus you will read in your books of *intrinsic* or *internal* and *extrinsic* or *external*, of *positive* and *negative*, of *principal* and *accessory*, of *general* and *local*, and of *mechanical*, *chemical* and *physiological* causes of diseases. Causes are also sometimes designated by the names *occult*, *specific*, etc.

The division of morbid causes into *predisposing* and *exciting* is convenient, and accords so nearly with the facts established by general observation, that it is now adopted by the profession generally.

A predisposing cause is one which, although not of itself sufficient to produce, yet so affects the system as to create a tendency to contract disease under the influence of some deranging circumstance called the exciting cause. Sometimes a third disturbing element is combined with the predisposing and directly exciting

causes. A predisposition to be affected by morbid causes generally may exist, and the third element of which I just spoke may give character or direction to the morbid affection that may result from the application of an exciting cause. Thus, debility is a state of the system in which exposure to cold is very likely to excite some form of disease, and if malaria be present, this may give the character of periodicity to the disease that will arise when the exciting cause is brought to bear. Malaria in such a case may be styled the *determining* cause; malaria, however, often acts as an exciting cause. A *specific* cause is one that always produces the same kind of disorder, and one that results from no other cause, as the contagion of small-pox, and the virus of syphilis, etc. There are many predispositions and derangements for which it is difficult or impossible to assign any clearly ascertained or satisfactory causes. The unknown or obscure circumstances that produce such affections may be denominated *occult* causes.

I shall consider first some of the leading predispositions to disease that are observed to prevail among mankind, and some of the known causes that give rise to them, and afterward notice a few of the more prominent exciting causes.

PREDISPOSITIONS.

Predispositions being states of the system in which it is specially liable to be attacked by disease, it is a matter of great importance for the medical man to be thoroughly versed in their nature and causes. The following arrangement of the predispositions will be observed in presenting what I have to say on this subject:

I. PECULIARITIES OF CONSTITUTION.

1. *Hereditary Tendencies.*
2. *Temperaments.*
3. *Idiosyncrasies.*
4. *Sex.*
5. *Age.*
6. *Influence of previous Disease.*

II. DEBILITY.

III. FUNCTIONAL EXCITEMENT.

IV. EXISTING DISEASE.

V. OCCUPATION AND MODE OF LIFE.

This classification differs, I am aware, from that adopted by any other author; but as no two writers agree in this respect, I feel at liberty to adopt the arrangement which seems best adapted to my purpose.

I. PECULIARITIES OF CONSTITUTION.

1. *Hereditary Tendencies.*—It is a well established fact that children inherit the constitutional peculiarities of their parents. If the parents have weak physical endowments the children are apt to be weak also, and consequently if the former were peculiarly liable to contract diseases whenever exposed to ordinary exciting causes the same is generally true of the latter; but long observation has established the fact that there are certain forms of diseases to which the predisposition is very frequently hereditary.

Thus scrofula, tuberculosis, asthma, epilepsy, insanity, and perhaps gout, are often observed to appear in several successive generations of the same family. In some instances the disease itself and not merely the tendency is believed to be transmitted from parent to child. This is certainly sometimes true of scrofulous affections, This predisposition to particular disease is called diathesis, as the scrofulous diathesis, etc. When a predisposition to any form of diseased action is believed to be inherited the individual should, as far as practicable, avoid the exciting causes likely to cooperate with the predisposition, and he should fortify his system so as to enable it to resist such influences of this kind as can not be avoided.

To determine whether or not an individual has inherited a proclivity to any particular malady, the history of his ancestors both paternal and maternal should be known. It is not enough to know that those forming the direct line of descent through which he traces his pedigree have escaped the disease. The fate of collateral branches of the family should be learned, as the hereditary tendency to a disease may be transmitted through parents who have escaped the disease itself.

2. *The different Temperaments* constitute predispositions to particular forms of disease. Temperament is without doubt in a measure congenital, but is subject to very material changes during life. The temperament of the adult often differs essentially from that of the child, and it often changes as age comes on. What is meant by temperament is a peculiarity of constitution caused by the relative predominance in the system of one or more of the functions. Thus we have the *sanguine temperament*, in which there is great activity of the circulatory system, evinced by a habitually strong pulse, florid complexion, warmth of the skin, quick movements, and lively disposition. Persons of this temperament are predisposed to acute forms of disease. The *phlegmatic* or *lymphatic* temperament contrasts strikingly with the sanguine,

being characterized by a weak pulse, languid circulation, paleness of the skin, and coldness in the extremities. It predisposes to scrofulous, asthenic and chronic diseases. The *bilious* or as it is sometimes called the *melancholic* temperament seems to result from deficiency rather than predominance of the biliary functions, but not sufficient to prevent a strong physical development. It is characterized by compactness of frame, firmness of tissues, freedom from corpulency, considerable powers of endurance under fatigue, and firmness though perhaps slowness and gloominess of mental character. It predisposes to derangements of the chylipoetic functions.

The *nervous* temperament is in many respects the reverse of the bilious. It is characterized by peculiar excitability and sensibility, by mental activity, by delicacy of tissue generally and especially by small muscular development. It constitutes a predisposition to nervous affections, as hysteria, neuralgia, chorea, etc., and when combined with the lymphatic temperament seems to favor scrofulous and tuberculous diseases.

Proper management may often work important changes in the temperament. Thus the lymphatic may by ample exercise in the open air, be so much improved by a gradual strengthening of the circulatory apparatus as to acquire many of the qualities of the sanguine, and the muscular system of the nervous temperament may in a similar manner be developed and the effeminacy of constitution overcome. The bilious temperament may acquire some of the delicacy of the nervous, and warmth of the sanguine, by temperance in living, intellectual occupation and mingling in cheerful society.

3. *Idiosyncrasies* are peculiarities of constitution that render some individuals liable to be affected by certain morbid causes in a way different from that in which the same causes affect people generally. Certain kinds of food ordinarily esteemed wholesome, always produce disease in some persons. I have known individuals who always had urticaria after eating mackerel; others must avoid honey on the penalty of suffering from colic. Some can not breathe the odor of roses or of new-mown hay without having an attack of asthma. Medicines affect some persons in a manner entirely different from their usual therapeutic effects. Peculiarities of this kind are by no means uncommon, and the knowledge and observance of them are sometimes very important.

4 *Sex*.—The sexes differ in peculiarities of constitution, and this difference results in some diversity of predisposition to disease

beyond what pertains specially to their respective generative organs.

The peculiarities of the female constitution consist in a predominance of the nutritive, sensitive and involuntary excito-motor functions. Hence the greater excitability of the nervous system in women and their pre-disposition to nervous affections. The higher muscular and vascular development in men, renders them liable to inflammations, from causes that would produce only functional disorder in women. Hence, while men are apt to suffer from rheumatism, gout and higher grades of inflammatory disease, women are more subject to dyspepsia, palpitations, headache, neuralgia, spinal affections and hysterical disorders. Women are more subject to changes of blood and of flesh than men, as the nutritive function happens to be modified by uterine influence. The establishment of the menstrual function in youth, the changes incident to child-bearing and lactation, and the revolution of constitution that is experienced at the cessation of the menses, are each attended with peculiar susceptibilities in the constitution. Many affections to which the female is predisposed, such as distortions of the spine, pulmonary consumption, anæmia and dyspepsia are probably the result in a great measure of her habits of life; but the tendencies to chlorosis and nervous disorder in youth, and to cancerous affections and functional diseases at the "turn of life" are predispositions clearly referable to the peculiarities of her constitution. After the female has passed safely through the vicissitudes incident to the termination of the reproductive function, she enjoys to some extent exemption from the peculiar liabilities of her sex. I believe that old age is not generally marked by greater infirmity nor attended by more liability to disease, in the female than in the male sex.

5. *Age*.—From birth to old age, the body is constantly undergoing internal modifications, which with the change of external circumstances, tend to vary the proclivities of the system to be influenced by morbid causes. So that different periods of life may be regarded as presenting different predispositions, or as some express it, *aptitudes*.

In *infancy* there is a predisposition to diseases of the brain, the rapid development of which is attended with so much activity of the circulation as renders it very liable to such diseases as produce convulsions, hydrocephalus, etc., when subjected to derangement.

The skin too being unaccustomed to contact with the air and the vicissitudes of extra-uterine existence, is peculiarly sensitive, and

subject to erythematous and papulous eruptions. The young alimentary canal is liable to be irritated by ingesta to which it is unaccustomed, and all the viscera are often subject to congestions and inflammations from recession of the blood from the surface under the influence of cold on the delicate skin. Dentition too increases the liability to intestinal, pulmonary and cephalic affection from the irritation it produces in the mouth and the reflection of that irritation upon the various organs through the excito-secretory nervous system.

Childhood or the period of rapid growth is peculiarly subject to disorders, connected with digestion and assimilation. The stomach and bowels are the seat of frequent derangements resulting from over-eating, improper food, worms and sympathetic affections; the blood is rapidly elaborated and often becomes overcharged with proteinaceous matters which, under deranging causes, predispose the child to inflammatory affections and may cause the occurrence of false membranes and other plastic or albuminous deposits. Hence the frequency of croup, mesenteric disease, tubercle, etc., at this period. Derangements of the nervous system are also common at this age, and from the excito-motor activity often take the form of chorea and convulsions.

Puberty is characterized by many peculiar susceptibilities which readily become morbid. This is especially true of the female sex. The occurrence of the menstrual function is always a critical epoch in the female constitution. The function exerts its influence upon the nervous system and upon the blood, and its failure to appear, or derangement after its appearance, inevitably throws the nervous and vascular system into disorder. Chorea, chlorosis, hysteria and the like are the diseases to which the female at this period is most exposed. Male youths are perhaps subject to no special predisposition to disease at this time, but they are too apt to be led by the influence of bad example and the prurient excitement of their genital organs into the terribly ruinous practice of masturbation, which if long pursued is certain to ruin the best constitution.

The termination of growth brings with it a predisposition to diversified disorders. The rapid nutrition incident to growth demands a large supply of materials, and the nutritive and assimilative functions are kept in vigorous action to supply the demand. But when nutrition becomes restricted to the repair of tissues, there is not generally a corresponding diminution of the blood-making functions, and an excess of plastic materials accumulates in the

blood-vessels. If the constitution is robust this condition predisposes to hypertrophy (excessive nutrition), hemorrhage and inflammation; but in the feeble, tends to cacoplastic or aplastic deposits. The assimilative function becomes diminished to correspond to the wants of the system, sooner than the habit of eating, and an excess of aliment tends to debilitate the digestive organs, and in this way dyspepsia is frequently induced.

Adult life can hardly be said to present any predisposition to disease, except from the formation of vicious habits of living, or the tendencies incident to the different occupations. Certain diseases it is true, occur most frequently in adult age and previous to decline, but they are such as may be attributed to the causes just mentioned, rather than to constitutional proclivity. Such are gout, gravel, rheumatism, indigestion and venereal disease. As mankind approach the period of physical decline, the influences of overstraining toil, whether of body or mind, of irregular, imprudent or vicious habits of living, begin to be manifested in those affections of the body that indicate the approach of age. Those whose lot has saved them from severe and exhausting labor, and whose prudence has guided them into habits of virtue, moderation and regularity, retain the full vigor of manhood longer than those who, from choice or fortune, have led lives of hardship, exposure, intemperance or turbulence and passion. The failure of the procreative function forms a peculiarly critical epoch in the life of the female.

In *old age* the equilibrium of the system becomes gradually impaired. The nutritive function so predominant in childhood, fails rapidly, the tissues become hardened, the bones fragile, the joints stiff, the muscles slow to act, the heart feeble and the nervous system obtuse. There is a tendency to degeneration of tissue, especially the fibrous and bony, and perversion of the processes of cell-development are often manifested by carcinomatous growths.

The forms of disease to which old age is predisposed depend in a great measure upon the previous course of life. If the muscular system has been fully developed by an active life, the heart frequently retains strength disproportionate to the general state of the system, and the force of the circulation may oppress or overwhelm the brain and spinal cord, producing palsy or apoplexy; and the same cause may develop diseases elsewhere, as asthma, intestinal disorders, urinary affections, etc. If on the other hand the heart be weak, there is a tendency to venous congestions, dropsy, deficient or disordered secretions and rapid failure of all

parts and functions that depend on a supply of arterial blood. Sometimes death of the extremities occurs from failure of circulation in the remote vessels. The general debility of the alimentary, respiratory and every other function subjects the aged invalid to gradual decline, and warns him that although he may escape accident and malignant disease, his course is nevertheless downward toward the grave.

6. *Previous diseases* often predispose the system to morbid attacks aside from the manifest state of debility in which they may leave it. Some inflammatory and nervous diseases seem to predispose the system to subsequent attacks, and the oftener they occur the stronger the predisposition seems to become. The system may appear to regain its accustomed health and strength between the attacks, but is evidently less able to resist the exciting causes of the disease. The oftener a person has inflammatory rheumatism the greater the probability he will have it again. So of croup, inflammation of the bowels, liver, kidneys, lungs, etc. Convulsive affections as chorea, hysteria and epilepsy, although they may appear to be thoroughly cured are apt to return, and the tendency is increased by each recurrence, and so also is the difficulty of arresting them.

The morbid predisposition in some of these cases probably exists in some modification of structure in the part wont to be the seat of morbid action. But in others, as rheumatism, gout, cutaneous diseases, etc., which seem to have their origin in some defect of the assimilative and excretory functions, the predisposition is probably increased by further depression of the defective functions, instead of structural changes in the parts where the disease is manifested. Although rheumatism is apt to return, it is perhaps no more apt to occur in the same joints or structures than in some part not previously involved, and so of the others.

Where tuberculous or carcinomatous disease has once been manifested in the system there is constant reason to apprehend a recurrence, not only because a constitutional predisposition is thereby shown, but because such diseases tend to increase the proclivity to morbid deposits or growths, as the case may be.

II. DEBILITY.

Causes.—The body is constantly exposed to influences that require to be resisted in order that health may be maintained. It is evident therefore, that whatever diminishes the resisting powers

of the system, renders it liable to fall into disease. But observation as well as reason teaches that this conservative power of the constitution depends in a great measure upon a vigorous condition of the organism. So that debility constitutes a state of predisposition and whatever tends to debilitate the system is a predisposing cause of disease. I can do little more than mention some of the chief agencies that affect the system in this manner.

1. *Imperfect nourishment*, whether from deficiency in the quantity or defect in the quality of the food, or failure in the digestive function to adapt it to the wants of the system, tends directly to produce debility. Starvation diminishes the powers of the constitution to bear up under the depressing influence of cold, of heat, bodily exertion, mental emotions, etc. It also favors attacks of low forms of fever and inflammation, and prepares the way for epidemic, contagious and endemic disorders. The predisposing effects of deficient or of bad alimentation are two-fold. It both diminishes the powers of resistance, and by contaminating the blood, adds greatly to the gravity of such diseases as may attack the system under such circumstances.

2. *Impure air* is another predisposing cause that exerts a debilitating influence. The difference is generally very striking between persons who habitually breathe an impure atmosphere, as the residents of the thickly populated and filthy streets and alleys in large cities, and the inhabitants of the open country and especially of hilly districts. It is probably one of the principal causes of the spread and virulence of certain malignant epidemics and contagions that often prove much more destructive in crowded and badly-ventilated places than where fresh, pure air circulates freely. This cause like the last, operates in two ways. It weakens the resisting power of the system, while poisonous exciting causes, which should be diluted or dispersed by free ventilation, are allowed to accumulate and become more and more concentrated. The influence of bad air specially predisposes to disorders of respiration, circulation and nutrition.

3. *Excessive bodily or mental exercise* is a debilitating cause of predisposition to disease. The body is invigorated by moderate exercise duly alternated with seasons of repose; but efforts of mind or body carried to the point of extreme fatigue, and especially without adequate rest and sleep, to allow the powers to be restored, always exhaust the functional power and produce muscular weakness and nervous excitability. Under such circumstances the

blood does not circulate freely, and is not duly purified by the excretory functions; there is generally a tendency to local passive hyperæmia in some of the organs; and the system readily yields to the influence of exciting morbid causes. Deprivation of sleep produces similar effects, even when not accompanied by toil.

4. *Want of exercise* also tends to debilitate the body. Persons who are confined to sedentary habits or who take little or no bodily exercise usually exhibit more or less torpor of the vital functions and general deficiency in physical stamina. True, there are apparent exceptions to the rule, but these exceptions merely demonstrate the strength of constitution which the parties enjoy. The use of the muscles in moderation appears to be necessary to keep up a vigorous condition of the circulation. Consequently an inactive life not only causes muscular weakness but sluggishness of the circulation, manifested by coldness of the extremities, inaction of the liver, feeble digestion, torpidity of the bowels, etc. The heart and nervous centers, under such circumstances, may at the same time be thrown into disorder by the presence in them of too much blood, and the individual experience palpitation, dyspnoea, headache, vertigo, sleepiness, obtuseness of the senses, etc. The blood not only fails to be duly distributed to the more remote parts of the body in the absence of proper muscular exercise, but it becomes impure from want of due aëration in the lungs, and deficiency of action in the excretory organs generally. In this way sedentary habits not only predispose to disease from other causes, but in many cases are alone sufficient to bring on serious local and general derangement. These remarks explain why persons of extremely inactive habits so often suffer from dyspepsia, constipation, hemorrhoids, gout, rheumatism, tuberculous and cal-culous affections, skin diseases, etc., etc.

5. *Long-continued exposure to heat* is another cause of constitutional debility and consequent predisposition to disease. When the body is surrounded by an atmosphere nearly or quite as warm as the blood, the combustion of effete materials within the system is diminished, as one of the purposes for which such combustion takes place is the evolution of heat, which under such circumstances is not required, and can not be endured as in a cooler atmosphere. To prevent excessive internal heat the watery exhalation of the skin is increased. The consequence is that effete and carbonaceous matters are accumulated in the blood while that fluid is thickened by the loss of water. In this state of things the mus-

cular system is debilitated, the circulation is sluggish, and the excretory organs and especially the liver are excited to undue efforts by the necessity of removing the hydro-carbonaceous matters that should be oxydized in the system, and thus prepared to be easily excreted. The system is therefore predisposed to be thrown into disorders characterized by biliary derangements, congestions of blood, depravity of the blood and the like. These considerations explain with sufficient clearness the peculiarities of the diseases of hot climates and of those that generally prevail toward the close of long, hot summers in this latitude. In the south the predisposition is often heightened to such a degree that malarial fevers are rendered fearfully malignant. In the north the system is so much debilitated by the hot weather that it is unable to resist the malarial influences of the autumn, and the occurrence of cool evenings, even in the absence of malaria, is very apt to produce many cases of disease characterized by internal congestions, biliary disorder, derangement of the bowels and fever. Climate is not however always at fault, for many persons are predisposed to similar forms of disease by overheating their rooms, sleeping on feathers and loading their bodies with an excess of clothing. The system should if possible always be exposed to a temperature that requires some activity of the calorific function to keep up the heat of the body, otherwise deterioration of blood and loss of constitutional vigor must ensue.

6. *Long-continued exposure to cold* also debilitates the system. Cold is a direct sedative to all the vital powers. The sudden and temporary application of cold is generally followed by reaction, in which the vital properties of the tissues are called into exercise, and this under certain circumstances promotes health and vigor. But long-continued exposure to a very low temperature depresses the system toward a minimum state of vital energy. The powers of the system are reduced in the effort to sustain its temperature. The demand for carbonaceous food is evidence that the respiratory function is being over-taxed. The skin is rendered torpid by the impression of the cold atmosphere upon it, while the blood tends to accumulate in the internal organs. This cause predisposes the system to low or adynamic forms of disease. It especially predisposes to disease of the lungs. Typhoid pneumonia is very apt to prevail in the latter part of severe winters, particularly among those whose circumstances have not permitted adequate protection from the cold.

7. *The habitual use of intoxicating drinks weakens the functions and deranges the structures of the stomach, liver, kidneys, heart and brain, and causes a vitiated state of the blood.* It predisposes to almost all the epidemics, such as fevers, dysentery, erysipelas, cholera, etc., and is often attended by rheumatism, dropsy, affections of the heart, and urinary and hepatic diseases. Not only are intemperate drinkers predisposed to attacks of disease, but when attacked they are always in much greater danger than they would be were it not for their vicious habit. There is no one influence that tends more directly and rapidly to depress the physical, mental and moral stamina of mankind than the habit of indulging in the use of intoxicating drinks, which unfortunately has become so prevalent; and it is the duty of every medical man to exert all his influence as a man and as a physician to arrest the evil.

8. *Depressing states of the mind have a debilitating influence on the physical constitution.* Persons living in a constant state of fear, grief or despondency have long been observed to be more liable than others to attacks of epidemic disease. Emotions that can destroy the appetite, embarrass the heart's action, derange the secretions, etc., might certainly be expected if habitually experienced, to induce a low state of the vital functions. Such a state of the mind is often worse than infection itself, for while the bold and reckless pass unhurt through seasons of cholera or other epidemics, those who take the most pains to protect themselves are often seen among the victims of the pestilence. Armies are much more likely to suffer from epidemics after an unfortunate battle than after victory, or when animated by the enthusiasm inspired by the anticipation of success.

9. *Waste of the blood by hemorrhage or excessive secretion must as a matter of course tend to debility.* It prevents adequate repair of the tissues of the body by robbing them of the plastic material, and vitiates the blood and disqualifies it for free circulation in the capillaries, thus favoring the occurrence of congestions, inflammations, dropsies, etc., under slight exciting causes. The low physical stamina of persons habitually afflicted with wasting discharges as menorrhagia, leucorrhea, diarrhea, etc., renders them peculiarly liable to suffer from the deranging effects of sudden changes of temperature, exposure to wet, or epidemic and malarial influences. Excessive venery has the same effect, especially upon males. The constitutional weakness caused by the inordinate secretion of

semen is often extreme, and predisposes the individual to various forms of disease.

Previous disease, from the debilitating effects of which the patient has not fully recovered, constitutes a predisposing cause of attacks from other diseases to the exciting causes of which he may be exposed, and to relapse into the same disease in perhaps a more dangerous form. Slight exposure to cold, inadvertency in eating, drinking, or bodily or mental exertion are often sufficient to excite a return of the same disease or the occurrence of some of its sequelæ, or cause him to fall into some other form of disease. Convalescence from some forms of fever and from prostrating inflammatory affections requires particular care and circumspection.

III. FUNCTIONAL EXCITEMENT.

The state of plethora sometimes induced by high feeding without sufficient exercise in persons possessing strong powers of digestion and assimilation, although not in itself a state of disease, constitutes a predisposition to certain morbid affections. The plethoric person is specially fortified against such exciting causes as cold, malaria, and infection, but is subject to derangement from causes that tend to increase functional excitement. I have already spoken of this condition under the head of general hyperæmia (page 113). In such a state of the system irritants and stimulants readily exalt the vital properties to an unsafe pitch, causing excessive or perverted action and endangering the integrity of structures. If inflammation occur, its grade is apt to be very severe, though as heretofore remarked the mere state of plethora, if the blood be good—does not constitute a predisposition to inflammatory attacks. But those modes of luxurious life, that induce plethora and depravation of the blood at the same time, as the use of highly stimulating diet, and vinous or alcoholic drinks previous to the ultimate debility which they tend to bring on, as noticed a few minutes ago, predispose the system to many accidents that are avoided by more moderate livers. Among them may be mentioned gout, rheumatism, inflammation of the stomach, intestines, liver, kidneys, and brain. Undue functional excitement from any cause constitutes a predisposition to some forms of disease, as where violent exercise endangers an attack of rheumatism upon exposure to cold. Stimulation of any organ to a state of excitement predisposes it to an attack of inflammation on the super-

vention of an exciting cause. Exposure to cold that might usually be borne with impunity, often causes inflammation of the kidneys where they are under the influence of a stimulating diuretic, or of the bowels when they are excited by a drastic purgative. A single glass of brandy or other alcoholic liquor is sometimes sufficient to cause inflammation of the brain during the excitement induced by hard study or strong emotions.

IV. EXISTING DISEASE.

When the system is laboring under disease of one kind it is often exceedingly liable to the occurrence of complicating disorders. In fevers there is a predisposition to local inflammations as of the stomach, bowels, spleen, liver, lungs, and brain, and local inflammation and other structural diseases on the other hand often prepare the system for the invasion of malarial and epidemic diseases. Tubercles in the lungs modify the condition of the circulation so as to lay the system liable to a variety of disorders, even before any definite symptoms of the pulmonary affection are manifested. Asthma, jaundice, and some other affections may result from derangement of the circulation caused by occult disease of the heart. The cardiac affection is here a predisposing cause to the other diseases.

Degeneration of structure in the kidneys renders the body more susceptible to the impressions of affections and poisons generally, from the failure of the excretory function. The effete matter that accumulates in the system during the progress of fevers is the deranging cause that predisposes to the local complications mentioned a few moments ago. And the accumulation of poisonous and effete matters in the system on the failure of excretion, when the channels for their discharge are interrupted by local disease, often lay the foundation for the most serious constitutional affections.

The system is often brought into a condition favorable to the occurrence of zymotic diseases as the eruptive fevers, typhus fever, puerperal fever, cholera, etc., by the presence in the blood of putrefactive matters, left by former constitutional disease, or accumulated during the cessation of the eliminatory functions. Under such circumstances a very slight degree of infection may be sufficient to establish a fermentation in the system that must result in disease of the kind which the infection tends to excite.

V. OCCUPATION AND MODES OF LIFE.

The liability to disease is very much influenced by the circumstances in which the person is placed and the habits of life he adopts. I have already spoken of the influence of want of exercise, of impure air, sedentary habits, excessive toil, continued exposure to heat or cold. Whenever an occupation is attended by any of these disadvantages it involves of course the liabilities which they produce. But some occupations are attended with other predisposing circumstances. The unnatural posture required by many occupations interferes with healthy functions. For this reason the shoemaker and tailor are apt to have disorder of the stomach from the compression to which they subject it. Workers in lead are predisposed to lead colic, and so strongly that in some instances they are attacked without the intervention of any other exciting cause than the poison contained in the system. Other occupations that require the workmen to constantly inhale irritating dust, predispose to disease of the lungs. But the various peculiarities of different trades and callings are too numerous to justify an attempt to recite them.

Something might be said with propriety under this head in regard to the effects of different kinds of diet, but this subject can be more clearly illustrated hereafter in connection with particular diseases. It is enough to remark that a preponderance of animal food tends to produce an over-stimulated state of the system and to surcharge the blood-vessels with proteinaceous matters, and thus predisposes to inflammatory disease, whereas an exclusively vegetable diet tends to effeminacy of constitution and favors the occurrence of scrofulous and tuberculous diseases and nervous disorders.

LECTURE XIV.

ETIOLOGY—CONTINUED.

Exciting Causes of Disease: I. Cognizable Causes,—1, Mechanical; 2, Chemical—Irritants—Corrosives—Septics—Alteratives; 3, Ingesta—Non-alimentary—Improper Quality of Aliment—Excess and Deficiency of Aliment in Quantity; 4, Excess and want of Exercise; 5, Excessive Nervous Action; 6, Excessive Evacuation; 7, Suppressed or Defective Evacuation; 8, Filth, bad Air, and Poisonous Vapors; 9, Atmospheric Vicissitudes.

EXCITING CAUSES OF DISEASE.

Classification.—In pursuing the study of morbid influences we will next consider the class called *exciting causes*. To this class belong all circumstances that have a tendency to cause any predisposition that may exist in the system to manifest itself in positive disease. These are so numerous that a rehearsal of all of them would be tedious and unprofitable, if not an endless task. It is also difficult to adopt a classification sufficiently comprehensive to embrace them all.

Some of the circumstances that directly tend to produce morbid states of the system are of such a character that we can take cognizance of their existence, independently of the diseases they produce, while others can not be discovered by any of the senses, and their presence can be determined only by observing their morbid effects. This has led to the separation of exciting causes, by some authors, into two classes, COGNIZABLE and NON-COGNIZABLE agents. For the sake of convenience I shall adopt this division, and will present the subject in accordance with the following arrangement:

I. COGNIZABLE CAUSES.

1. *Mechanical.*
2. *Chemical.*
3. *Ingesta.*
4. *Bodily Exertion.*
5. *Excessive Nervous Action.*
6. *Excessive Evacuation.*

7. *Suppressed, or Defective Evacuation.*
8. *Filth, bad Air and Poisonous Vapors.*
9. *Atmospheric Vicissitudes.*

II. NON-COGNIZABLE CAUSES.

1. *Endemic Poisons.*
2. *Epidemic Poisons.*
3. *Infectious Poisons.*

I. COGNIZABLE CAUSES.

1. *Mechanical Causes.*—These may produce morbid effects in several ways. In the first place they may cause those injuries of structure which pertain to the department of surgery. But mechanical influence may impede or derange the functions in a way that demands the attention of the physician. In a former lecture I spoke of diseases produced by mechanical and chemical causes (page 64), and as but little can be said in regard to the nature of mechanical influences further than to point out the derangements they produce, it will be sufficient to refer you to your notes of that lecture for what I might introduce in this place. I will briefly enumerate a few of the more common mechanical causes of morbid conditions:

Improper modes of dress may involve such pressure upon parts of the body as to impede vital functions, and even produce permanent deformity. The habit of wearing the neck-cloth or stock too tight, may impede the return of blood from the head and cause headache, or even apoplexy. Tight-lacing, by compressing the chest so much as to restrain respiration and embarrass the heart's action, often produces fainting or palpitation, and by forcing the abdominal viscera into too small a compass, may interrupt the passage through them, causing indigestion, constipation, and various other disorders. Irritation or inflammation may be caused by calculous formations situated beyond the reach of surgery, and call for the palliating interposition of medicine, as biliary and renal calculi. Hardened feces may produce obstruction of the alimentary canal, and excite irritation and inflammation by mechanical influence. Mechanical causes not unfrequently produce disease of the air-passages, as irritation, inflammation, and alteration of structure from particles of metal, stone, or other substances, inhaled by mechanics while engaged at their work.

A great variety of structural diseases might be mentioned, as

tumors, hypertrophy, degeneration, etc., that act as mechanical causes of other diseases, but it is deemed unnecessary to enumerate them.

2. *Chemical causes* act chiefly as *local irritants, corrosive poisons, septic poisons, or chemical alteratives*. The difference of their effects in these several ways is not however always owing to a difference in the nature of the chemical agent, for the effect often depends upon the state of concentration in which the agent is applied, and the duration of the application.

Among chemical *local irritants* are the dilute acids, alkalies, and various salts, the affinities of which for the constituents of tissues is resisted by exalted action of the part with which they come in contact.

The *corrosive poisons* overcome the vital affinities by their powerful chemical affinities, and thus decompose and kill the tissues as far as their full influence extends, and beyond this excite irritation and inflammation to greater or less extent. The strong acids and alkalies, certain metallic salts, chlorine and iodine belong to this class.

Septic poisons act as causes of putrescent decomposition, and this may be the result of agents introduced into the system, as sulphureted hydrogen, putrid animal effluvia, contagious and miasmatic effluvia, the virus of serpents, rabid dogs, etc., or of fermenting matters generated in the system by disease; all of which probably operate through the influence of chemical affinities.

Chemical alteratives change the results of digestion and assimilation, and modify the blood, textures, secretions, etc. Alkalies and acids act in this way by their chemical affinity for each other. Salts act in the same manner by the tendency of their constituents to enter into new combinations under the influence of elective affinity.

3. *Ingesta*.—The solid and liquid substances taken into the system form a long category of exciting causes. In addition to their mechanical and chemical effects, substances received into the system may be the sources of morbid affections in several ways. For the purpose of presenting the causes that naturally fall under this head in a succinct manner, let us divide them into three classes:

Non-alimentary ingesta.

Aliment of improper *quality*.

Excess and deficiency of aliment in *quantity*.

Non-alimentary ingesta are not always injurious if taken in small quantities, but if used without discretion they may give rise to disease in several ways. Condiments, as spices, pickles, and the like, are often the cause of gastric intestinal irritation and functional disorder, and sometimes originate congestion and even inflammation.

Alcoholic liquors have similar local effects. Their stimulating influence may increase the appetite temporarily, and excite the digestive organs to extraordinary activity, but this increased action soon depresses the vital powers, and loss of appetite, nausea, and perhaps vomiting ensue, and if their excessive use is persisted in, all the evils of dyspepsia, if not more grave forms of disease, are sure to follow. But the evil influence of alcoholic liquors is not confined to the digestive organs. They are absorbed by the veins, and carried with the portal blood directly to the liver, where they exert their stimulating and irritating influence, exciting the organ to undue functional activity, inducing determination of blood, and giving origin to those functional and structural diseases of the liver so commonly found in habitual dram-drinkers. And their injurious effects do not stop here. They reach the heart and arteries, and excite them to over-action to such a degree that the tonicity of these organs is soon diminished. By their presence in the blood-vessels, they impair or prevent the assimilating processes and interfere with nutrition, and in this way produce more or less derangement of the fluids and solids generally. The functions and structures of the nervous system especially, suffer from the effects of alcoholic liquors. The inebriation they are capable of producing classes them with the narcotic poisons. They first produce unnatural cerebral excitements, which is soon followed, if a large quantity has been taken, by arrest of the voluntary and, to some extent, of the spinal reflex motor functions. Sometimes the toxic impression is so deep that respiration is arrested or so far repressed as to produce stasis of the blood in the brain and other organs. Thus alcoholic drinks often excite apoplexy, palsy, inflammation of the brain, and delirium tremens. When habitually taken, even in quantities not sufficient to produce intoxication, they cause headache, loss of appetite, and depression of the animal and intellectual powers, to such a degree that abstinence is attended by feelings of prostration and wretchedness. The system is, in fact, in a state of disease caused by the stimulating drink.

The habit is almost certain to cause a necessity for a gradual

increase of the daily amount necessary to keep the system stimulated to the point of comfort and capacity for duty. The gradual diminution of susceptibility, of which this is proof, is a circumstance that marks the wide difference between alcoholic drinks and substances that afford real support to the system, by supplying some of the elements of which its fluids and solids are composed. They impart no strengthening influence whatever, but merely stimulate the system to over-action—to perform within a short period those functions which should occupy a longer time—and thus produce a present appearance of strength at the expense of future debility. Many men are thus gradually frittering away their lives without suspecting that they are or ever will be drunkards. They are, however, drunkards in reality; the only difference between them and the daily inebriate being, that the point of satiety in them is reached each day with less manifestation of the narcotic effects of the poison, than are seen when the same point is reached in his system. And the evils are the same in a pathological point of view. The predisposition to disease pointed out in my last lecture, (page 198,) is often as great in the moderate drinker as in the sot, and the terrible penalty of delirium tremens is, perhaps, as frequently suffered by the one as the other. I have seen more cases of this affection among those who would have scorned to be called drunkards, than among those who were habitually intoxicated.

I have devoted more time to this subject than I had designed, but the ravages of intoxicating beverages in community, and I am sorry to say among medical men as much as any other respectable portion of society, are so terrible that I felt called upon to impress upon you my views of their effects, in hope that you may not only shun their use yourselves, but do all in your power to save mankind from their ruinous influence. They may be used by some persons without producing their legitimate results, they are even beneficial if judiciously administered in some states of the system, but as a beverage in health, they always do harm and generally produce ruin, and the only rule of safety for any individual is that of *total abstinence*.

Tea and coffee, if taken in excess, produce morbid effects. Their injurious influence is chiefly manifested in derangements of the nervous system, as neuralgia, palpitation of the heart, fainting, wakefulness, etc. I have seen cases simulating mania *à potu* in its mild form, which were clearly traceable to the inordinate use of one of these beverages. They do not generally, however, like alco-

holic drinks, produce a want in the system that can only be met by gradually increased potations, especially if taken with the meals, and they appear to afford support to the body, and especially to the nervous system. *Caffein* and *thein* are said to be very nearly identical, and to contain a larger proportion of nitrogen than any other known vegetable proximate principles. These articles do not therefore, strictly fall under the head of non-alimentary substances, though I found it convenient to refer to them in this relation.

There are some articles which although not strictly alimentary are nevertheless necessary accompaniments of food and are required for important purposes in the system, which may prove injurious if taken in improper quantities. Water is an article of this kind. This is the safest beverage for man, and is the proper diluent of his food and of the blood. Yet if taken too largely it distends the stomach, interferes with digestion, dilutes the blood and "accelerates the retrogressive transformation of the blood and textures, as manifested by the increase of matter excreted by the kidneys and intestines." Water used as the common beverage and for culinary purposes, is often the menstruum in which deleterious substances are introduced into the system. Decaying vegetable and animal matters are probably often contained in the water obtained from rivers and even wells within or near large cities, and cause diarrhea, dysentery, cholera and typhoid disease. Lead is probably sometimes contained in water that flows through leaden pipes, and its gradual introduction into the system produces at length "constipation, colic, cachexia, anæmia, and atrophy." Water strongly impregnated with lime causes constipation, and probably favors the occurrence of calcareous degeneration and the formation of calculi. Various other impurities are often contained in water which it is unnecessary to enumerate.

Common salt is another substance that is demanded by the system, but which may be injurious if injudiciously taken. An excess of salt in the stomach retards digestion and produces thirst and feverishness. Wherever there is in the body an excess of salt there will be osmosis and exosmosis of the fluids until the salt is equally distributed in the blood and tissues. The effect is to diminish, temporarily at least, the fluids within the blood-cells and on the surface of serous and mucous membranes, which creates the demand for water that is expressed by the feeling of thirst. Although antiseptic in its influence it seems to hasten the destructive transformation of tissues, and increases elimin

kidneys. Liebig informs us that it impedes the deposition of fat. "Animals will not fatten on salt food;—this is a hint for the corpulent" says Dr. Williams. Salted provisions used to the exclusion of vegetables hasten the production of scurvy.

Medicines injudiciously taken into the system are very often exciting causes of disease. The use of patent nostrums, and of common drugs in domestic medication, has caused an incalculable amount of mischief; and when prescribed by regular practitioners, medical agents frequently produce evils greater than the disorders for which they are administered. It is often one of the chief duties of the physician to prevent his patrons from injuring their health by the use of drugs; and when medicine is required, he should make it a rule to employ such agents only, as may be given without the risk of doing more harm than good.

Aliment of Improper Quality.—For the principles involved in the subject of appropriate diet for man, I must refer you to the works on physiology. It is enough for me to remark here, that the two purposes subserved by the food we eat are the formation of tissues, and the production of heat, and that our aliment must contain a due admixture of nitrogenous and hydro-carbonaceous constituents to render it suitable to meet these two demands.

The matters suitable to be employed as food may be chiefly embraced in the following groups: *albuminous, gelatinous, oleaginous, saccharine* and *amylaceous* substances. The first two of these groups are nitrogenous, histogenic, or tissue-forming; the other three are hydro-carbonaceous, combustive, or heat-producing.

Albuminous substance is contained in the lean flesh of quadrupeds, fowls and fish, in milk and in vegetable food generally. It is however more concentrated in animal muscle than in vegetables, and this concentration renders it more difficult of digestion. This is one reason why a mixed diet is better for man; animal food furnishes proteinaceous matter in a concentrated form, while vegetable substances contribute bulk to the food, and by being mixed with the animal portion render it more easy to be acted upon by the gastric juice. *Excess* of animal, and even of vegetable food of highly nutritious character, as fine wheat bread, oppresses and deranges the digestive organs, causing dyspepsia, etc., or if these organs are very vigorous, tends to the production of plethora, and an over-excited state of the system, is apt to contaminate the blood with imperfectly elaborated elements, and may cause hemorrhage, apoplexy, inflammation, rheumatism, gout, lithiasis, etc.

Deficiency of albuminous food produces an impoverished state of the blood, weakness of the muscular system, and wasting of the muscles and other structures.

Articles of this group that are not of good quality excite disease, either by irritating the stomach and alimentary canal, or by failing to be duly elaborated into plastic material. Their tendency is to degenerate and assume the noxious forms of lithic and lactic acids, urea, etc. They are often the cause of gout, rheumatism, calculous disease, cutaneous eruptions, or low febrile disorder. Stale meats, sour or badly baked bread and heavy pastry may be mentioned as examples.

Gelatinous substance is obtained from animal tissues only, and is generally presented to the palate in the form of soups, broths and jellies. These are not nearly as nutritious as albuminous articles, yet when combined with good bread and other vegetable food, they constitute a satisfying and nourishing diet. They can not be relied on as an exclusive diet however, for confinement to them results in a failure of strength and loss of flesh.

Oleaginous matters as butter, fat of meat, and vegetable oils afford material for combustion and the production of heat. But they also contribute to the formation of structures and secretions, though incapable of being transformed into textures in the absence of albuminous substances. They constitute the chief source of the adipose tissue of the body. Their place can in a measure be supplied by the action of the liver on the albuminous constituent of the blood when that is very plentiful; but this is done by liberating nitrogen and thus requiring an increase of the renal excretion to remove it. This internal formation of fat from albumen, moreover, falls short of meeting the demands of the system for combustive material.

Deficiency of fat in the food causes loss of flesh, dryness and inactivity of the skin, brittleness of the hair and nails, deficiency in the mucous, synovial and biliary secretions, defective digestion, irregularity of the bowels, and especially a diminution of the natural warmth of the body. Privation in this regard is of course more injurious in cold than in hot weather.

Excess of oleaginous food disorders the stomach, causing heart-burn, nausea, and rancid, disgusting eructations. When the excess is habitual it sometimes produces corpulency; but if not deposited in the form of hypertrophy of the adipose tissue, it causes disorder

of the liver, manifested by bilious diarrhea, jaundice, etc., and of the sebaceous follicles of the skin, as acne, etc. A larger proportion of oily food can be borne in cold than in hot weather, and by persons of active than those of sedentary habits.

The *quality* of oily food has as much to do in producing disease as excess or deficiency. Articles that have commenced or are on the verge of commencing to undergo chemical change, and those that tend to become solid are more likely to be injurious than those that are fresh and of a liquid character. Rancid butter, fat and oils offend the stomach by the production of butyric and oleic acids, and solid fats being difficult of minute division are not readily emulsified by the pancreatic and other secretions so as to be absorbed.

Amylaceous or *starchy* substances as arrow-root, sago, tapioca and the like, so much in vogue as food for children, and also *saccharine* matters, possess no histogenic value, and as compared with oils are inferior in calorific power. They are however important elements of food, as they serve to dilute the albuminous and oily substances and render them more easy of digestion and of transformation within the system. They are capable of being changed into fat, but not with sufficient rapidity to supply the place of that article. In some constitutions their use in *excess* leads to obesity, probably because they take the place of the oils in the combustive process, and leave the latter to be formed into adipose tissue. They are however more apt to cause disease by passing into fermentation, in which case they give rise to acetic, lactic, and oxalic acids and other injurious matters. Saccharine substances are more prone to fermentation than the starchy. The diseases which excessive use of these articles of food may cause are very numerous, among which may be mentioned, dyspepsia, diarrhea, diabetes, rheumatism, oxaluria, etc.

Deficiency of articles containing these weaker combustive materials, is the cause of failure in the appropriation of the more nutritious substances. Hence the want of due admixture of fresh vegetables, which are rich in starch and sugar, with the food, is the cause of scurvy. As such articles also contain nitrogenous substances, they are capable of sustaining the system alone, although animal food taken with them renders the aliment better adapted to the demands of nutrition where manual or mental labor causes rapid waste of tissues. But under no circumstances can

their use be long neglected without injury. But vegetable food should be fresh and good, otherwise it is very certain to disagree with the system and cause disease.

Many of the diseases and tendencies to disease that afflict society, grow out of errors in diet. Did mankind always follow the teachings of nature in this respect, much of human suffering would be prevented. The appetite, if unperverted, would without doubt generally express the wants of the system correctly, both in regard to the quality and quantity of food. But from the desire to enjoy the pleasurable impressions of palatable articles, mankind are always on the alert for expedients to increase their capacity for eating, and to find articles that may afford the pleasures of taste when the demands of the stomach are fulfilled. Hence the employment of stimulating condiments with the meals, and the introduction of sweet-meats, puddings, pastries, and the like, under the name of dessert. The habits of polite society in these respects, call loudly for reform.

Excess and Deficiency of Diet as to Quantity.—Upon this division of the subject, it is unnecessary to occupy much time. The evil effects of eating more food than can be digested, are too numerous for recital, and so well recognized that none can plead ignorance in this regard.

The harm done by excessive quantity of food depends in a great measure on the state of the digestive powers. If these fail of converting the food into chyme and chyle, the alimentary canal is disturbed and irritated by accumulations of the undigested substances, and crampy diarrhoea, colic, congestion, gastritis, enteritis, or even convulsions may be the consequence. If the digestive powers are strong, an excessive amount of aliment may be thrown into the blood-vessels and derange the assimilative functions, distend the vessels, degenerate into noxious elements, and produce serious constitutional disorder. Apoplexy, hemorrhage, gout, gravel, and other forms of disease, often have this origin. The evil effects of overfeeding are of course greatly increased by want of exercise.

Deficiency of food, in addition to the predisposing debility it induces, may be an exciting cause of various forms of disorder. Extreme hunger is attended by alternations of nausea and a sense of sinking at first, and afterward by fever, delirium, general functional disorder, failure of strength and animal heat, and ultimately by death. In cases of death from starvation, the stomach is sometimes found to be inflamed; caused probably by the chemical action

of the gastric juice. When the supply of food falls short of the demands of nature, vascular and nervous irritation is generally produced.

Among the more direct morbid effects of deficiency of diet, the following may be mentioned: Deficiency in quantity and quality of the blood; failure of nutrition, causing atrophy, and destruction of the less highly organized structures, as seen in disappearance of fat, sponginess, and bleeding of the gums, ulceration of the cornea and other structures of little vascularity, scurvy, cachexia, etc. When the system has been reduced by deficient nutriment, to the cachetic state, it is often difficult, sometimes impossible, to restore it to health, from the failure of the digestive and assimilative powers, and must in all cases be managed with the utmost delicacy and care. But the effects of a scanty supply of food, not only impoverishes the blood, but tends to deprave it. The excretory functions become impaired with the others, and the effete and putrescent matters that should be removed, are permitted to accumulate, as evinced by the foul breath and fetid effluvia that proceed from the persons of such patients. This tendency to accumulation of poisonous matters in the system, is probably increased by the low vitality of the tissues, disabling them to resist the tendency to decomposition. Absorption is generally active in such cases, for the empty vessels naturally take up whatever fluids escape into the interstices of the structures, and with them such matters as they hold in solution. All the structures waste away, even the bones are diminished in weight; though it is said that the nervous centers lose less substance than other structures. The vital forces seem to concentrate themselves in these inner recesses of the system, and here longest withstand the assaults of famine. For this reason the predominant active symptoms manifested in such cases are of a nervous character.

There can be no doubt that scrofulous and tuberculous affections are often excited by deficient diet, where there is a predisposition to such disorders, and that in other cases the same cause frequently leads to structural degenerations.

4. *Bodily Exertion*.—Excessive bodily exertion often excites disease where there is a predisposition. A person with a feeble heart may suffer great injury by bodily effort to which he is unaccustomed. The heart and the large blood-vessels may be strained and their functions or structures impaired by the stress that is thrown upon them during inordinate muscular efforts, owing in part to

retardation of the blood through the smaller arteries by the compression exerted upon them by the contraction of the muscles. Violent exertion often causes cerebral difficulties, as confusion of mind, ringing in the ears, dimness of vision, convulsions, apoplexy and palsy. The brain being situated in a plenum, so that it can not enlarge, and being composed of soft, compressible substance, suffers from compression under the heart's action during excessive muscular effort (page 124), and the danger is increased if the exertion is made when the body is in a stooping posture (page 181).

The lungs may be congested by having the blood too rapidly forced into them during excessive bodily exertion. This may be, and often is, the origin of serious disease, as cough, dyspnoea, hæmoptysis, or pneumonia.

Every part of the system, in short, is liable to be morbidly affected by violent muscular exertion, either immediately by disturbance of the circulation, or, secondarily, by the nervous exhaustion that such exertion may produce. Pain in the muscles, pain in the back, sleeplessness, etc., are common results of excessive bodily labor. It may also impair the blood, especially if long continued, by causing waste of structures beyond the amount which the excretory organs can remove. Thus it may not only induce a predisposition, as shown in the last lecture, but cause a truly morbid condition of the system, amounting to serious disease.

Want of bodily exercise excites disease in many cases. It produces disorder of the secretions, especially that of the liver, and of the blood also, and gives origin to dyspepsia, hemorrhoids, nervous disorders, etc.

5. *Excessive Nervous Action.* The influences of the nervous system, when over-exercised, in exciting disease are easily recognized. Excessive intellectual labor is as exhausting as muscular, and not only predisposes to disease by the debility it induces, but may be the exciting cause of grave disorder. In predisposed states of the brain, it often produces congestion, and even inflammation of that organ, while headache, insomnia, etc., are among its most common effects. Violent emotions, also, often cause present disorder by the disturbance they produce in the circulation. Palpitation of the heart, paleness, or suffusion of the skin, and coldness of the surface and extremities, are some of the most common and least important morbid symptoms produced by the emotions. But they often cause serious disorders, such as spasms, hemorrhages,

disordered secretion, and sometimes paralysis, insanity, dementia, and even sudden death.

Severe pain may cause a shock to the system from which it will not readily recover. One of the chief advantages of anæsthetic agents in surgery and midwifery, consists in the protection they afford from the shock of the system that agonizing pain inevitably produces. Sudden pain often causes fainting, and I have known many patients to be thrown into spasms by intense suffering.

6. *Excessive Evacuation.* Rapid hemorrhage, by suddenly reducing the quantity of blood, though the amount lost may not be very great, is capable of producing irregularity, or even cessation of the action of the heart, and such a diminution of the currents sent to the brain as to cause fainting, convulsions, delirium, or death; and a large, though less sudden loss of blood, may produce similar effects. If the hemorrhage occur when the patient is in the erect position, a less discharge will cause fainting than when he is lying horizontally, and it is not uncommon for patients who have been bleeding, to swoon away on attempting to rise. These facts show that excessive evacuations of blood make a more marked impression on the brain than on the heart. It is said that extensive varicose veins in the lower extremities, are sometimes capable of holding so large a quantity of blood as to cause fainting, if the patient attempts to stand without having his legs bandaged. The sudden withdrawal of water from the abdomen in ascites by paracentesis, may cause fainting by removing the pressure from the blood-vessels, for which reason it is necessary to keep the body compressed during the operation, by a bandage that can be gradually tightened as the water escapes.

Excessive purging, vomiting, menorrhagia, and seminal discharges, are exhausting to the vital energies, and may produce syncope if very profuse, or if they occur in a debilitated state of the system. Excessive evacuation in either of these ways may be as injurious as hemorrhage or blood-letting.

7. *Suppressed, or Deficient Evacuation.* As the blood requires to be constantly depurated by the discharge of excrementitious matters, suppression or deficiency of any of the natural excretions tends strongly to excite disease. The effects depend, of course, in a great measure, upon the character of the evacuation which is at fault.

Retention of urine distends and may cause irritation, inflamma

tion, or even rupture of the bladder. The urine may be partially re-absorbed, give a urinous smell to the perspiration and breath, and cause nervous depression, delirium, convulsions, coma, or death. On post-mortem examination of such cases the fluid effused into the serous cavities is found to contain urea. *Suppression of urine* produces similar effects on the system.

Retention of feces in the large intestines deranges the system by permitting fetid matter to be absorbed by the veins and poison the blood. The hardened scybala that remain may obstruct the bowel and produce irritation and inflammation, ulceration, hypertrophy of the muscular coats from efforts at expulsion, induration, stricture, prolapsus ani, hemorrhoids, etc.

Suppression, or even deficiency of the menses is often an exciting cause of morbid states in the female. The catamenial blood is highly carbonized and is therefore an important excretion, and its deficiency devolves additional duty on the lungs and liver especially, in the effort to dispose of the carbonaceous matter thus left in the system. The bad state of the blood in such cases is apt also to embarrass the nervous centers and cause nervous disorders.

Abnormal evacuations of long standing can not generally be suddenly suppressed without exciting more or less disorder. The closure of an issue, seton, or other artificial drain that may have been established as a therapeutic measure, and kept up for a long time; the sudden checking of profuse chronic diarrhea, and the healing of old sores from which puriform or sanious matter has been regularly discharged, are very apt to be followed by constitutional disease or derangement of some of the important organic functions. The same is true of habitual hemorrhagic evacuations, as epistaxis, bleeding piles, etc.

The disorders that follow these causes depend in a great measure, upon the character of the evacuation that has been arrested. If it consisted of pure blood, the chief symptoms are those indicating fullness of the blood-vessels, which may embarrass the circulation generally, or cause local congestions. But where the matter thrown back on the system is depraved and poisonous the effects are sometimes deplorable. In either case the results that are to follow depend very much upon predisposition of the patient. Congestion of the brain, lungs, liver, kidneys or bowels, hemorrhages, inflammations, rheumatism, gout, apoplexy, epilepsy, palsy, hysteria, mania, etc., etc., may be originated in this way. The too hasty arrest of some cutaneous eruptions is often followed by

disease of internal organs. I have known severe inflammation of the brain follow the cure of long-standing tinea capitis, or scald-head.

8. *Filth, Bad Air and Poisonous Vapors.*—Personal cleanliness has been recognized from time immemorial as promotive of health. Regular daily bathing should be practiced by every individual whose occupation causes perspiration or exposes his skin to contact with matters that adhere to it; and all persons in every situation in life, should keep all parts of their bodies free from accumulations of perspirable and other excrementitious matters, which are daily voided from the system. Of all the kinds of poison to which mankind can be exposed there are none more offensive and injurious to health than the gaseous, aqueous, oily and fecal excretions of the human body. If they are not promptly voided they poison the blood and nervous system, and destroy health and life; and their deleterious influence is even greater when, after escaping from the body and undergoing the putrescent changes caused by atmospheric influences, they are permitted to remain upon the surface, or accumulate in the clothing or place of abode, poison the air, and be re-absorbed through the skin, received into the lungs, or into the stomach with the food and drink.

But the accumulation of filth from other sources than the body itself, is a prolific exciting cause of disease. It contaminates the air, favors the propagation of vermin, affords a nidus for epidemic, and infectious poisons, generates malaria, clogs the skin and impairs its functions, nauseates and debilitates the stomach, deranges the secretions, diminishes self-respect and moral sensibility, and in innumerable ways produces morbid impressions. The frequency and fatality of all forms of disease in the filthy abodes of the degraded and wretched inhabitants of the alleys, lanes and suburbs of cities is sufficient proof of all I have said.

Bad air is an efficient cause both of predisposition to and the immediate occurrence of disease. Many atmospheric impurities are non-cognizable, and their nature and mode of action in producing disease can only be hypothetically considered. Others, however, are readily recognized; their origin, chemical character and manner of influencing the system having been clearly ascertained. Such for instance are carbonic acid, carbonic oxide, carbureted hydrogen, hydrosulphurous acid and ammonia, all of which are spontaneously produced by natural processes; and chlorine, muriatic acid gas, and nitric oxide, that are evolved in certain

artificial chemical processes. There are others not so well understood, though their morbid influence is unequivocal, as some of the gaseous exhalations evolved from living bodies, both vegetable and animal, and the aëriform products of spontaneous decomposition, of combustion, of some manufacturing processes, and evaporation of liquids.

Impurities of the air may do harm in several ways, the principal of which may be embraced under three heads: 1, They may exclude the pure atmosphere from the lungs either by taking its place in the air-passages and air-cells, or by irritating the air-passage so much as to produce spasmodic closure of the glottis. To act in this way the deleterious agents must exist in a state of considerable concentration and the morbid impression they there produce, shows itself in the form of asphyxia. 2, They may cause irritation and inflammation of the air-passages. 3, They may be absorbed into the system through the lungs, the common integument, or the mucous membrane of the alimentary canal, and poison the blood, and through that fluid reach and morbidly affect the nervous centers and other organs of the body.

Carbonic acid being an excretion constantly escaping through the air-passages, its presence in the inhaled air prevents the excretion from taking place, and thus prevents depuration of the blood. It is doubtless also absorbed into the system, and in this way increases the depravity of the blood. The consequences of its inhalation are embarrassment of the respiratory process, and a narcotic impression on the brain. When much diluted with good air its effects are gradually produced, but when highly concentrated it produces asphyxia at once.

It is generated by combustion, fermentation, the preparation of lime from limestone, shells, etc., the respiration of men and the lower animals, and in many of the processes of nature. It accumulates in rooms where charcoal or anthracite is burned, where a number of persons are congregated together either asleep or awake, unless sufficient apertures exist for the entrance of fresh and the escape of bad air. Its irritating influence is often manifested by the almost universal coughing that occurs in a large congregation, seated in a church or other public building where the windows and doors are kept closed. Where several persons sleep in a small room without ventilation, the weakness and languor they feel in the morning is the result of the depressing effects of this gas.

Carbonic oxide is also evolved in the combustion of charcoal, is

powerfully narcotic in its influence, speedily destroying sensibility and motor power, if breathed in concentrated form; and when more diluted producing drowsiness, stupor, giddiness, blindness, nausea, quickness and irregularity of the pulse, etc. Burning charcoal has frequently been selected as a means of effecting suicide, and its speedily fatal influence is without doubt owing in a great measure to the stupefying effects of the carbonic oxide evolved in connection with carbonic acid.

Carbureted hydrogen or fire-damp is the explosive gas generated in mines and subterraneous excavations. It is also developed in ditches, swamps, and quagmires. When considerably diluted with atmospheric air, it does not appear to be highly noxious, as it is breathed with impunity by miners even when its presence endangers an explosion unless their lamps are covered by wire-gauze. When sufficiently concentrated to materially exclude the atmosphere from the lungs it produces the symptoms of narcotism, owing probably to the arrest of respiration and consequent stasis of blood in the brain.

Sulphureted hydrogen is chiefly generated during the putrefaction of animal matters or excrements, as in burial-vaults and privies. It is a violent poison, and contact with it in a concentrated form has often been the cause of sudden death. Its effects when inhaled even in minute quantities are nausea, drowsiness and nervous pains, and when much of it is received into the system it produces depression of sensibility, derangement of the motor functions as shown by convulsions, and depression of the heart's action as exhibited by a feeble, irregular pulse and coldness of the skin. Its presence in the atmosphere predisposes to, and is believed sometimes to be an exciting cause of low adynamic fever.

Sulphurous acid, chlorine, muriatic acid gas, nitrous acid vapors and ammonia are all irritants, and any of them received into the lungs in a concentrated state is capable of producing inflammation of the air-passages.

Morbific states of the atmosphere, caused by the presence of aëri-form impurities that can not be chemically detected with the means now within our command, are very common. They tend to depress the vital powers by interfering with the respiratory function, by embarrassing the action of the skin, and by vitiating the blood. They not only predispose to low or typhoid forms of fever but often reduce the system to a positively pathological condition. But I can not now occupy more time with this subject.

Atmospheric Vicissitudes. There are no more common exciting causes of disease than great or sudden changes in the state of the atmosphere.

Extrêmes of heat or cold are destructive to vitality. Life can not be sustained in a part, the heat of which is raised above 180° F., at which point the albumen of the blood coagulates, or depressed to 32°, so that its water freezes. The conservative powers of the system enable it to resist for a time the effects of greater extremes of atmospheric heat and cold than those mentioned; but when the blood itself is brought into either of those conditions, its circulation ceases and life becomes extinct in the part. Where congelation is not very extensive, nor continued too long, and the return to normal temperature is judiciously managed, life returns to the part with the renewal of the circulation, and little permanent change of condition is produced. The profession are now taking advantage of this fact in the application of freezing mixtures to the extent of producing local insensibility, in minor surgery.

But it is not my purpose to consider those effects of heat and cold that produce surgical injuries, but to speak briefly of those influences that demand the application of therapeutic agents.

Exposure to *intense heat* stimulates the vital functions, and in this way *disorders* and *exhausts* them. When a person is in a hot bath the pulse is quickened, the skin becomes congested, red and hot, the temples throb, the head aches, a sense of feverish excitement prevails throughout the system, and unless the tension is relieved by a profuse perspiration, there is danger of congestion, or even inflammation of some of the more predisposed organs.

Exposure of the person, and especially of the head, to the direct rays of the sun, or to intense artificial heat, causes headache, apoplexy, or inflammation, according to the intensity of the heat, duration of exposure, and the condition of the person so exposed. *Coup de soleil*, or sun-stroke, is an instance of the power of intense heat to overcome and exhaust the vital functions of the brain.

Exposure to cold is attended with *direct sedation* of the vital powers. Cold contracts the capillaries and arteries, producing a pale and shrunken appearance of the surface; and it thickens the blood, rendering it less capable of free circulation in the capillaries; and thus by a two-fold influence embarrasses the circulation. When applied to the surface it produces intropropulsion of blood to the interior of the body by preventing its reception into the

cutaneous capillaries, and thus causes visceral engorgement and embarrassment of the heart's action. Hemorrhage is sometimes caused in this way, as epistaxis, hæmatemesis, etc., and stupor and insensibility, and loss of motor power from engorgement of the brain and spinal cord, are the well-known effects of long exposure to intense cold.

The *secondary* or *indirect* effects of cold are familiar to all. If not continued so long as to destroy life, reaction follows, which may amount to irritation, and even result in inflammation. The intensity and duration of the cold, as well as the previous condition of the system, modify the secondary effects. Chilblains, gangrenous, or erysipelatous inflammation, paralysis, and perverted sensibility, often result from previous exposure to severe cold. The violent reaction that follows the return of the blood into the capillaries of a part that has been severely chilled, is evidence of perversion of the vital properties of the part, and affords us the unmistakable indication to prevent the too sudden influx of blood by cold applications to the part. Where the entire system has been chilled the precaution just mentioned is uncalled for, because the entire mass of the blood being diminished in temperature, and the vital energies generally depressed, reaction will probably be equal throughout the body, and may be favored by warmth and stimulants without danger.

The secondary effects of cold, even of slight intensity, in particular states of the system, or when suddenly applied, are frequently experienced. People generally are liable to "take cold" from sudden exposure to a draft of cold air, especially if in a state of heat or perspiration, by wearing damp clothing, sleeping in damp apartments, getting the feet wet, etc. The effect of such exposure manifests itself not in the part where the temperature was reduced by the coldness of the air or the evaporation of the moisture, but by catarrh in the air-passages, derangement of the bowels, liver, kidneys, nervous system, etc. How shall we account for these effects? Some writers attribute them to nervous influence; others to changes in the circulation of the blood. I believe both hypotheses to be true. Retardation of the circulation on the surface, or in the extremities, throws greater stress on the capillaries of mucous membranes and internal organs generally, while nervous depression at the surface causes hyperneurosis of internal organs through the excito-secretory sub-system of nerves. In this

way nervous irritation and hyperæmia is produced in the part most predisposed to be morbidly affected, and the disorders incident to taking cold are the result.

Electrical changes in the atmosphere affect the health of the body, and probably have much more to do with the production of disease than the medical profession have heretofore appeared to realize. Every one is conscious of changes in the condition of his system, in different states of the atmosphere, and that independently of appreciable changes of its temperature. The nervous functions of the body are without doubt carried on through the influence of an agent similar in its nature, if not identical in essence with common electricity; and it is certainly reasonable to suppose that atmospheric electricity is constantly exerting its influence on an apparatus bearing so intimate a relation to this subtle fluid.

Electricity is known to be a powerful stimulant to the nervous system, and is capable of being employed to great advantage as a therapeutic agent, and its application in excess, whether artificially or through atmospheric influence, exhausts vitality, deranges the circulation, changes the quality of the blood, and, if very intense, suddenly destroys life, as by the lightning's stroke.

Moisture in the atmosphere affects the system by modifying the action of the skin and lungs, influencing the temperature, and especially the electrical condition of the body, and by being the vehicle for conveying miasmatic and other subtle poisons, for which it has an affinity.

LECTURE XV.

ETIOLOGY—CONTINUED.

Exciting Causes, Continued: II. Non-Cognizable Agents; 1, Endemic Poisons. 2, Epidemic Poisons, Different Theories, Ozone, Schönbein's Researches; 3, Infectious Poisons, Difference between Infection and Contagion, Modes of Access to the System, Mode of Operation within the System, Protection from Subsequent Attacks.

EXCITING CAUSES, CONTINUED.

Let us now pass to the consideration of those causes of disease which in the arrangement I announced to you yesterday are designated as

II. NON-COGNIZABLE AGENTS.

Explanatory Remarks.—The morbid causes that are embraced under this head have furnished grounds for much conjecture and discussion among medical men. Their existence in the form of matter has never been demonstrated, although their influence on the human system has long been recognized, and some of the laws by which they are usually governed have been determined by long observation of their effects.

The term *zymotic* (from ζυμη, a ferment) has recently been applied to these poisons by some writers, and appears to be obtaining extensive currency among medical journalists and authors. I think it very applicable to poisons that produce their morbid impressions on the system by causing septic changes in the blood, but where they are merely conveyed to the nervous centers by the blood as a vehicle, without altering its quality, I think the term inapplicable.

The morbid agents now to be considered are embraced in our arrangement under the following heads:

1. *Endemic Poisons.*
2. *Epidemic Poisons.*
3. *Infectious Poisons.*

1. *Endemic Poisons.*—The term endemic (from εν, in, and δημος,

people) is applied to diseases that appear to arise from causes that exist among the people or in the district where they reside. Thus goitre or bronchocele is an endemic affection that occurs in the deep valleys of certain mountainous districts, there being some influence that produces the disease among the people residing in the valleys, that does not operate so generally upon the mountains nor in level countries. Ague is an endemic disease prevailing among the inhabitants of marshy districts.

Most of the causes of endemic disease appear to exist in the atmosphere constituting *malaria* (bad air). It is probable however that in many places the water used by the inhabitants is the medium through which the morbid cause is introduced into the system. It may consist in some substance held in solution by the water, or in the ova of insects or animalcules, germs of vegetables, etc. It is certain also that the peculiar habits of some communities originate special forms of disease among them. [The most prevailing endemic poisons are without doubt marsh miasmata, but as so much space is occupied with this subject in the lectures of Prof. Jones, I omit the part of my lecture that treats upon it and refer the reader to page 270 of this volume. S.]

2. *Epidemic Poisons*.—Epidemic is derived from *επι*, upon, and *δημος*, the people, because diseases of this character appear to originate from some pernicious influence that comes upon the inhabitants from an extraneous source. Epidemic diseases like the endemic, generally attack many persons in the same community and at about the same time; but they do not occur annually or at stated seasons; are not confined to particular localities, although they may prevail more extensively or violently in some places than in others in the same neighborhood. They spread over large districts of country and even whole continents, sometimes with great rapidity, sometimes with a slow and steady progress. Their duration in any district may be very brief, or they may continue to prevail for months or even years, and then entirely disappear. Sometimes they return in a very short time, in other cases years may supervene before they reappear. Occasionally a new disease, that first makes its appearance as an epidemic, appears to fix itself as an endemic disorder.

It appears almost certain that the epidemic poison, whatever its nature may be, is something in the atmosphere; for it is inconceivable how any morbid influence can spread over an entire continent and pass from one continent to another, through any other

medium. But the nature of the epidemic influence has in every case, hitherto remained an unsolved mystery. Various hypotheses have been proposed as presenting explanations of the phenomena of epidemics, but none have yet been suggested that satisfactorily account for all the known facts. The ancients attributed them to the displeasure of the gods, and the astrologers referred them to the influence of the planets. In more modern times it has been suggested that they are caused by swarms of invisible migratory animalcules, by the germs or sporules of vegetable fungi in the air, by electrical changes in the atmosphere, by the presence of an excess or deficiency of ozone in the atmosphere, etc. The ozone theory appears to me to be the most plausible that has yet been originated. If the deductions that appear to be legitimately drawn from the researches of M. Schönbein and others, shall be justified by further scientific developments, we have in my opinion a clue to the true solution of the problem. As the most convenient, brief, and lucid exposition of the influence of ozone as an agent in contaminating and purifying the atmosphere I will read you an article from Ranking's Half Yearly Abstract, No. xvii., page 21.

"M. Schönbein's additional researches have still further developed the analogy of this substance (ozone) to chlorine, and leave no doubt of the injurious effects it may exert on the respiratory organs when in excess. Mice soon perish in an atmosphere containing $\frac{1}{1000}$. The quantity which prevails in the atmosphere is very variable, being proportionate to the amount of electricity, and therefore at its maximum in winter, and its minimum in summer. It is, however, highly probable that, when existing only in minute quantities, it exerts a purifying effect on the atmosphere by destroying various deleterious miasmata. There are a great number of inorganic gaseous bodies, which, when diffused in scarcely appreciable quantities, yet render the air irrespirable—such as the gaseous compounds of hydrogen with selenium, sulphur, phosphorus, and arsenic—gases characterized by the facility with which they become oxidized. Ozone belongs to a class of bodies which, as agents of oxidation, rapidly destroy these hydrogenous compounds. An incessant source of miasmata exists in the variety of gaseous compounds which are incessantly liberated by the decomposition of the innumerable masses of organic beings which perish on the surface of our globe. Although the composition of most of these is unknown, it is to be supposed that their accumulation would render the air unfit for respiration. Nature

has, however, provided the means of destroying such deleterious compounds as fast as they are generated, for M. Schönbein regards ozone, which is so constantly generated under electrical influence, and is so powerful an agent of oxidation, even at ordinary temperature, as specially destined to that end. His experiments prove that air containing $\frac{1}{5000}$ of ozone can disinfect 540 times its volume of air produced from highly putrid meat; or that air containing $\frac{1}{111000}$ of ozone can disinfect an equal volume of air so corrupted. Such experiments show how little appreciable by weight miasmata may be, which are yet sensible to the smell, and how small is the proportion of ozone necessary for the destruction of all the miasmata produced by the putrefaction of organic matter, and diffused in the atmosphere.

"We may admit that the electrical discharges which occur incessantly in different parts of the atmosphere, and determine there the formation of ozone, purify the air by ridding it of oxidizable miasmata. At the same time that these are destroyed by ozone, the organic miasmata cause its own disappearance, and prevent dangerous accumulation of it. The opinion that storms purify the air may not be without foundation, as a large quantity of ozone is then produced. In the author's experiments, he has always found a large proportion of ozone in the vicinity of the stormy clouds on the Jura; and air ozonized by phosphorus, for experiment, gives forth a similar smell to that perceived amid storms in mountainous regions. It is very probable that, in certain localities, the balance between the ozone and the miasmata does not prevail, and disease may be the consequence. As a general rule, however, numerous experiments have shown that the air contains free ozone (though in very different proportions), so that no free oxidizable miasmata can there exist. M. Schönbein recommends that the atmosphere should be tested for ozone, in localities and at periods where fevers and other forms of disease prevail, so that the results of accumulated observations may be obtained."

When it is stated that epidemics characterized by symptoms of irritation and catarrh generally prevail in cold weather, and those marked by vitiation of the blood and depression of the nervous system are more common in warm or hot seasons, it certainly does not appear unreasonable that the former may result from the irritating influence of such an agent as ozone, when "at its maximum," and to the prevalence of deleterious miasmata, when the agent that should destroy their influence is at "its minimum." But it will

not do to dogmatize on this subject; it must still be regarded as an open question.

Before dismissing the subject of epidemic influence I will remark that it is often found to prevail as a modifying influence in diseases produced by other causes. Almost every season the prevailing disorders in the community assume what may be called a *type*, that appears to depend upon some kind of epidemic influence. Fevers will generally present a high, a low or intermediate grade. There is generally also a tendency to complication of fevers by affections of particular organs; in one season by disorder of the brain; in another by affection of the lungs; in another by derangement of the bowels, etc. The exanthemata and other contagious disorders, as small-pox, measles, scarlatina, hooping-cough, etc., are often epidemic in character, spreading with unaccustomed rapidity and exhibiting unusual malignancy; and the same diseases are often attended by an epidemic influence which appears to be entirely distinct from the causes that produce them, and which modifies their course and symptoms, or causes them to be complicated with other forms of disease.

3. *Infectious Poisons.* The term infection is applied to all forms of poisonous matter which, proceeding from a person affected with disease, have a tendency to produce the same disease in other persons. It embraces the idea expressed by *contagion*, but covers more ground than that term. Contagion literally implies touching or contact, and applies strictly to such poisons as pass directly and unchanged from the bodies of the sick to those who are exposed by contact. But it is by no means restricted to that meaning, for contagious matter may undoubtedly be conveyed to great distances by the air, by clothing and other fomites. I think, however, that the term contagion can not properly be applied to any form of poison that is incapable of producing the disease from which it originates by contact or inoculation. There are many diseases that evidently propagate themselves by the evolution of matters capable of contaminating the atmosphere, and being conveyed by fomites, that can not be reproduced by inoculation with the blood secretions, or any other unaltered matter obtained from the bodies of the sick. The matter evolved appears to require the action of the atmosphere, and to undergo some putrescent modification before it is capable of producing the disease from which it sprang. Such diseases are infectious certainly, but can not be properly called contagious. Contagious diseases are

infectious, but infectious diseases are not necessarily contagious. See Prof. Jones views on this subject, page 446 of this volume.

After the explanation just presented of the meaning of the two words infection and contagion, it will lead to no misunderstanding to place both of these causes of disease under the head of *infectious poisons*, and speak of them together, without taking pains to distinguish them in the few general remarks I have yet to offer.

There are three different ways in which infection may operate :

1. It may be introduced into the blood through wounds or abraded surfaces, as the virus of kine-pox in vaccination, or that of hydrophobia by the bite of a dog.

2. It may be received by contact of the skin or mucous membranes with the poisonous matter; in which case it may operate locally, by planting the disease in the part to which it is applied, or be absorbed into the blood-vessels, poison the blood, and affect the system at large.

3. It may taint the air, and find its way into the system by being inhaled into the lungs, swallowed with the food or saliva, or absorbed through the skin.

Some diseases are capable of being propagated in all of these ways.

As to the way in which infection produces disease after being introduced into the system, two leading theories are advocated :

1. That the infectious poison is a septic matter, that acts as a leaven or ferment, producing *chemical* changes, by altering the *affinities* and molecular relations of proteinaceous or other compound constituents of the blood and tissues.

2. That the propagation of infection is a *vital* process: that the poison consists of the ova of animalcules, or of vegetable germs, which, finding a favorable nidus in the body under certain circumstances, are developed into living beings during the period of *incubation*, and rapidly propagate their species, so long as they find support in the body. That some contagious local affections are thus propagated is beyond question, as scabies by the ova of the *acarus scabiei*, or itch insect, and porrigo favosa, by implantation of the seeds or sporules of a microscopic, vegetable fungus.

Infectious poison is destroyed by a high temperature. It is said to be rendered harmless by a heat exceeding 120° F. Cold, if it does not destroy it, renders it inactive. Chemical agents, and especially chlorine, are capable of destroying its poisonous property.

Its propagation and virulence are promoted by warmth and filth, and exclusion of fresh atmospheric air. These considerations seem to give plausibility to the theory of germ propagation, and if the process of fermentation is in reality, as claimed by some very respectable authors, "caused by the production and growth of living molecules of a vegetable nature (*tortulæ*), which have the power to modify the affinities of the material in which they are developed," then both the theories of which I have spoken are merged into one.

The fact that some diseases that are propagated by infection are not usually contracted twice by the same individual is not easily explained. Liebig, who advocates the chemical theory of fermentation, attributes it to exhaustion of that particular matter in the system, the fermentation of which gives rise to the morbid symptoms that characterize the disease. The same theory applies with equal pertinency to the theory of propagation by animal ova, or vegetable germs.

In no case, however, can one attack of a contagious disorder be regarded as absolute security against a future attack, because there is no disease but that has occurred the second time in the same persons. Subsequent attacks are generally more mild than the usual form of the disease, though occasionally individuals die of small-pox and other contagious diseases that seldom occur a second time, after having had the same once or even twice before.

I shall here dismiss the subject of morbid causes, having devoted to it already more space than it should occupy in this part of my course of lectures. On almost every part of the subject my remarks have been very brief, and yet I have not been able to discuss many topics intimately connected with it. These, however, will come up incidentally in the consideration of special diseases, and shall then receive such attention as each may seem to demand.

LECTURE XVI.

SYMPTOMATOLOGY, OR SEMEIOLOGY.

Symptoms and Signs of Disease: Definition and Explanation of Terms; Physical Signs; Methods of Discovering,—1, Inspection—2, Touch or Palpation—3, Pressure—4, Succession—5, Percussion—6, Auscultation; Vital Symptoms; Sources and Interpretation—The Pulse, Skin, Tongue, Alvine Evacuations, Urine,—Interrogating Patient and Others—Liability to be Misled; Diagnosis: General and Special, Method of Conducting Examinations; Prognosis; Empirical, Rational, Circumstances to be Considered.

SYMPTOMS AND SIGNS OF DISEASE.

The next subject to which I call your attention is Symptomatology, which is one of the most important branches of medical science; and should therefore receive your special attention. You can not while your patient is living have the privilege of exploring the interior of his person and observing the state of his organism. When the watchsmith desires to learn the exact condition of a time-piece that is placed in his hands, he can open the case, and by means of his magnifying glass inspect most of the machinery while it is in motion, or he can take the watch to pieces without injuring any of its parts, and having detected the difficulty and made the necessary adjustment, put it together again as before. But in our efforts to repair the complicated living mechanism of the human body, we are compelled to rely upon external phenomena in order to determine the internal condition of the system. These phenomena therefore constitute the physician's eye-glass, by means of which, if intelligently employed, he obtains a clairvoyant view, not only of the physical but of the vital changes that are produced by disease.

Definition and Explanation of Terms.—Symptomatology or Semeiology is that branch of medical science which treats of the symptoms and signs of disease. Symptoms are the phenomena that are caused by disease during its progress. Any observable change in the condition of a patient that indicates disorder of function or of structure is a symptom of disease. It may be very obscure and

indefinite as to the locality or nature of the pathological state that produces it, still, if it indicates that disease is present, it is a symptom. *Signs* are those symptoms or other circumstances that can be relied upon as making the disease known. I know that authors do not agree as to the distinction proper to be made between symptoms and signs. Dr. Wood says "*symptoms* are those effects of disease which are either sensible to the patient or perceptible to the observer. *Signs* are the evidences by which disease is made known. All symptoms are necessarily signs; but there may be signs which are not symptoms. Thus the age or sex of the patient may serve to fix the character of some particular affection; and the cause of a disease, when known to us, often determines our opinion of its nature. These may, therefore, be signs; but they can not be considered symptoms." Dr. Williams says "a symptom may often prove to be a sign; but many symptoms are of such uncertain connection with a particular disease, that they can not be said to indicate its presence, and therefore they can not be called signs." When doctors disagree who shall decide? I shall not attempt to give an authoritative decision, but must take the liberty of expressing the opinion that Dr. Williams' exposition is the better of the two; being more rational and practical, and more nearly in accordance with the meaning of the word sign as employed in common parlance. In accordance with either of these distinctions, both the symptoms and the signs of a disease may consist of circumstances connected with vital changes or physical peculiarities. But it has become common with medical writers to restrict the terms, especially in the description of special diseases, by using the expressions *physical signs* and *vital symptoms*, and as these designations are convenient, and as technical or conventional terms not very objectionable, I shall occupy a short time in giving you an explanation of the way they are applied.

The *physical signs* of disease are such changes in the properties of the body or any of its organs as are perceptible to one or another of the senses of an observer. They therefore embrace all those modifications of the body or any part of it, that change the form, size, color, firmness or density, weight, temperature, odor, and the sounds that may be developed by percussion or heard in auscultation. The following are the principal methods employed in searching for the physical signs of disease.

1. *Inspection*.—By simply looking at a patient we may often discover important evidences of disease. We may observe his move-

ments; attitudes; the general form of his body; any want of symmetry, whether of one region as compared with others, or of one side as compared with the other side of the same region; the state of his system in regard to fullness or emaciation; the expression of his face; color and other peculiar appearances of his skin; the appearance of his eyes, lips, gums, tongue, throat, and all other parts that can be made visible. Certain instruments, as the tongue, spatula, speculums, etc., are employed in bringing parts into view that can not be seen without their aid.

2. *Touch or Palpation.* By placing the palm of the hand, or one or more of the fingers upon the surface, we may learn the condition of the skin in regard to its temperature, moisture, dryness, roughness, etc., and often perceive the character of internal movements, as the action of the heart, or pulsation any where; the thrill imparted to the walls of the chest in certain states of the respiratory apparatus by the act of breathing and coughing; the fluctuation of a fluid when pressure is made with the other hand; the movements of a tumor when the patient changes position, etc., etc.

The orifices of the body may be examined by the finger, as the fauces, posterior nares, vagina, and rectum.

3. *Pressure* with the hand or fingers may enable us to ascertain the condition of a part in regard to sensibility, density, elasticity, fluctuation, emphysema, as indicated by crepitation, and edema by pitting, the state of the capillary circulation by the promptness with which the color returns after pressure, etc. We may by pressure upon the abdomen ascertain the presence of air in the intestines by the gurgling sound it produces, and by pressure upon the pulse we perceive its force, etc.

4. *Succussion*, or shaking a patient with a sudden motion, will sometimes produce a splashing sound in the chest, indicating that there is a cavity containing both water and air.

5. *Percussion.* Striking the surface to produce sound.

6. *Auscultation.* Listening to sounds produced within the body.

[For an explanation of these two methods of exploration the reader is referred to Prof. Jones' lecture on physical diagnosis, in the second volume of this work. S.]

As a prerequisite to the advantageous study of physical signs, the physician must possess accurate knowledge, not only of the anatomy and physiology of the human body in its normal state, as a type or standard of health, with which he may compare every

case that falls under his observation, but he must to a certain extent, acquaint himself with the normal physical peculiarities of each individual he examines. The size, shape, attitudes, complexion, warmth of surface, pulse, respiratory movements, etc., etc., of healthy persons, differ so greatly, that what must be regarded as evidence of disease in one, may be entirely consistent with health in another. It is also necessary for him to be acquainted with those branches of natural philosophy that explain the laws of force which govern the movements of solid bodies and fluids—*dynamics*, and *hydraulics*; the production and transmission of sound—*acoustics*, etc.

Nor is knowledge in these several matters all that is required. The observer's senses must be educated so as to be capable of perceiving the most minute circumstances connected with each case, and of detecting the slightest variations in appearance, density, sound, smell, etc. It is astonishing how acute the senses may become under proper training. It is remarkable, also, what apparently trivial circumstances may become matters of grave importance when their signification is understood. The intelligent and observant practitioner will often be able to gather important information in regard to the condition of a patient, by perceiving and correctly interpreting circumstances that entirely escape the notice of a more casual observer, or one whose eye, ear, hand, etc. have not been subjected to the discipline of patient and long-continued training.

In making physical explorations a great deal of address and attention to the circumstances and feelings of the patient are often required of the practitioner. It is often important to take observations, as far as practicable, without the patient being conscious of the fact; for the knowledge that the physician is searching for the signs of disease, will so agitate some patients as to obscure the phenomena which it is his purpose to detect. The expression of countenance and frequency of the respiratory movements and pulse are especially liable to be affected by mental emotion. When the hands are to be placed upon the surface, care should be taken that they are not cold, and all manipulations should be made in such a manner as to cause as little uneasiness or pain as consistent with the object of obtaining correct information. If the finger is to be introduced into the mouth it should be scrupulously clean, and the nails short and smooth. When the vagina or rectum is to be explored by the finger, it should be covered with oil or lard.

Great delicacy should be manifested in the examination of females, in protecting their persons from unnecessary exposure. The bosom should be covered with linen or muslin in percussion and auscultation of the chest, and even examinations per vaginam through the speculum, may be conducted in a manner that removes the most objectionable feature of the operation. A slit large enough to admit the instrument may be made in a sheet by ripping a few stitches of the middle seam, and then the introduction of the speculum and examination of the os uteri may be effected without that shock to feminine sensibility which is inseparable from the removal of the covering from her person.

The Vital Symptoms of disease are those phenomena that result from modifications of the vital properties of the organism. They are, for the most part, more generally manifested throughout the system than are the physical signs, and for this reason they are sometimes called *general* symptoms. They are sometimes also distinguished by the name of *rational* symptoms, because the pathological conditions they indicate are ascertained by intellectual deduction, instead of being discovered by direct observation. But some of the physical signs may be general, and vital symptoms are often limited to particular localities, as the color, moisture, and warmth of the skin, the appearance of general dropsy, etc., on the one hand, and headache, colic-pain, dimness of vision, etc., on the other; and both require an intelligent interpretation of their meaning before they afford any valuable instruction.

An attempt to enumerate all the vital symptoms of disease would of course be utterly futile; and even if it were practicable, such an enumeration would be out of place in the general view of the subject we are now taking. Examples of the symptoms produced by disease of the vital functions have heretofore been given in connection with elementary functional diseases; as modifications of muscular contractility (pages 71, 72, 73), excessive and defective tonicities (pages 75, 76), increased, diminished and perverted sensibility (pages 79–81), derangements of voluntary motion (pages 84, 85), of involuntary motor power (pages 92, 93, 94), and diseased nutrition (pages 98–101–104). But as disease of a single vital property seldom continues long alone, the vital symptoms of disease are almost always more or less complicated; and one of the highest qualifications of the thoroughly informed and experienced physician consists in his ability to analyze the coincident phenomena presented by disease, and refer each symptom to

its true pathological source. It would be a great mistake to consider local spasm as resulting from mere increased muscular irritability, and treat it with local applications alone, in case the pathological cause existed in the motor ganglion, or at some other point in the excito-motor nerve-arc, through which the affected muscle was controlled; or to treat a case of cholera infantum as a simple affection of the stomach and bowels, when the source of the difficulty was irritation of the tri-facial nerve from teething.

Symptoms are for the most part ascertained by examination of the state of the different functions, since the functions are necessarily modified by changes in the vital properties of the organs by which they are performed. I can only take time for a summary consideration of some of the most reliable symptoms, and the sources from which they are derived.

The Pulse. The condition of the pulse generally presents important symptoms, indicative of the state of the nervous system, of the vital properties of the heart and arteries, and the quantity and quality of the blood.

A *frequent* pulse indicates excitement of the heart, which may be due to some peculiar irritating influence exerted on that organ by the blood or by the nervous system, or to increased irritability in the heart itself. It is often present in debility, in which state the demands of the system require the heart to make up in the frequency of its contractions what it lacks in force.

A *slow* pulse indicates deficiency of susceptibility in the heart, or else deficiency of stimulus exerted upon it; and as the heart is stimulated to action both by nervous influence and the blood, the fault may lie in the nervous centers or in the quality of the blood, or in both.

A *quick* pulse, which means that each contraction of the heart is of short continuance, generally indicates irritation and debility combined. The ventricle, under some irritating impression, contracts suddenly, but owing to debility does not prolong the effort.

A *hard* or *tense* pulse, indicates unusual strength in the heart's contractions, and high arterial tonicity. When hard and *small* it is sometimes called *sharp* or *wiry*, and indicates a small current of blood. When large and well sustained it is called a *full* pulse. *Softness* or *compressibility* of the pulse indicates diminished tonicity, and if at the same time small, is evidence of great prostration. A soft pulse is necessarily a *weak* one.

A *full* pulse indicates a large current of blood, and may be a

consequence of plethora, of peculiar strength and prolongation of the ventricular contractions, of relaxation of the arteries, so that they swell unusually under the force of the heart's action, or of obstruction in the capillaries, which prevents the arteries from discharging the blood forced into them. A contracted or *small* pulse, indicates a small arterial current, and may be owing to general deficiency of blood, or to obstruction in the lungs or other interior organs, so that too much of the blood is retained on the venous side of the circulation.

Irregularity of the pulse generally indicates disease of the heart itself, either functional or structural. When there is no structural disease it implies impaired susceptibility and weakness. When there is structural disease the qualities of the pulse that indicate it are physical signs.

The Skin. Many symptoms are discovered by due examination of the skin. The state of the capillary circulation is ascertained by the color, and by the promptness or tardiness with which the blood returns after pressure by the finger. A *florid* skin indicates activity, and a *purple* skin sluggishness of the circulation. *Paleness* denotes either general anæmia or internal congestion. A *dry* skin shows that its secretory function is impaired, and a *hot* skin indicates an exaltation of the calorific function incident to an excessive activity of the capillary circulation, and the deficiency of healthy secretion. When a kind of passive perspiration occurs, with a hot skin, it may cool it in a measure, but is rather a sign of low vitality than of return to health. A *husky* skin is the result of altered secretion and modified nutrition in the papillæ and sebaceous follicles. Unusual sensibility of the skin is a symptom of disordered nervous function. These peculiarities of the skin are physical signs of the condition of the common integument itself, but they are often important vital symptoms of functional derangement of the circulation, of the nervous system, and of the secretory and nutritive processes generally.

The *tongue* often presents appearances that constitute important vital symptoms, aside from those that may indicate a diseased condition of the organ itself. If the tongue be *enlarged* we may know that there is hyperæmia if not inflammation of the organ, but it may result from some irritation like the action of mercury in the system. *Contraction* of the tongue indicates deficiency of blood with some degree of irritation, or else great feebleness of the heart's action. A *red* tongue is a symptom of local or general

arterial excitement, of gastric inflammation, or of an irritated condition of the air-passages. A *livid* or *purple* tongue implies the same thing as a similar color of the skin,—embarrassed capillary circulation and imperfect aëration of the blood. A *pale* tongue generally denotes anæmia and debility. A *dry* tongue, if not caused by long breathing through the mouth, is indicative of deficiency in the secretions, and especially in those of the alimentary canal. A *hot* tongue when not dependent on disease in the mouth, implies a general febrile state, and a *cold* tongue denotes prostration of the general vital powers. A *white* fur on the tongue indicates fever; a *yellowish* fur biliary disorder; a *dark* fur a bad state of the blood and low condition of the system.

The *urine excretions* furnish important symptoms. They may be *feculent*, indicating accumulation of fecal matter simply; *bilious*, denoting excessive secretion in the liver; *watery*, denoting congestion or debility of the mesenteric veins; *mucous*, indicating irritation of the intestines; *bloody*, from passive hemorrhage, irritation or inflammation of the bowels; or *clay-colored*, in deficiency of the biliary secretion. A great many other peculiarities might be mentioned in regard to the dejections, all of which have meaning and need to be studied carefully: such as their odor, form, frequency, etc., but I have said enough to indicate their importance as a source of morbid symptoms, and must leave more minute instruction to be given in connection with special diseases.

From the *urine* we may obtain symptoms both of the condition of the urinary organs and of the general system. It is only within a comparatively recent period that this excretion has begun to be duly appreciated as a source of pathological information. The urine is continually being changed in character in accordance with the ever-varying state of the blood. The quantity, color, specific gravity, chemical qualities, and sediments of the renal excretion, if properly observed and studied, will often afford an insight into the state of the system that can not be so well obtained through any other means. The tendency to plethora or anæmia, to waste of tissues generally or of some one kind of tissue more than another, is often clearly indicated by the quantity or quality of the urine, and its appearance is often important as a principal or collateral symptom of the condition of the biliary and other secretions.

Some vital symptoms can be learned most readily by interrogating the patient, particularly those indicative of sensory disorder. But by far the greater number are only to be discovered by the

physician's own observations. He sees spasmodic action or irregularity of muscular movements, he tickles, pricks or pinches the skin to ascertain the state of the reflex motor function; he inspects the evacuations, he feels the pulse, touches the skin, hears the breathing, cough and voice, smells the breath, etc., and thus by the use of his own senses observes the case in all its aspects. In the examination of small children and other patients who can not answer questions, his only resources are his own observations or those of attendants. The history of the previous symptoms, the habits, age, constitutional peculiarities and idiosyncrasies, are generally to be learned of the patient or those who know him, and also much other information which may lead to a knowledge of the predisposing, exciting and determining causes, and other matters tending to influence the case and assist in its diagnosis. When the symptoms are obscure, deficient, or complicated, every circumstance that can throw light upon a case assumes a degree of importance.

Many cases occur in which the physician is liable to be misled. This is especially the case in regard to affections of the organs of generation. He is not unfrequently applied to for advice in cases of alleged amenorrhea, for instance, by females who hope by deceiving him, to obtain medicine to "bring on their courses," under the supposition that such remedies will produce abortion and save them the disgrace of exposure. It sometimes requires much ingenuity and careful management to avoid the risk of giving offense, and at the same time clear away or confirm the suspicions that such applications often excite. There are no difficulties more perplexing, and that require more patience and sound judgment, than those connected with the necessity of obtaining the symptoms and other facts of a case at second hand. Patients will often deny their own habits of eating, drinking and improper exposure, or they will magnify their sufferings or make statements that have little or no foundation, except in the fancy or falseness of their own minds, with a view of awakening sympathy, or to avoid taking medicine, and sometimes with no conceivable motive for their conduct. Thus, through the ignorance, conceits, and perverseness of patients the medical man, and especially the young practitioner, is often perplexed beyond measure in his efforts to obtain information upon which he may base his diagnosis and treatment. But fortunately cases of this character are exceptions to the general rule. Intelligent and right-minded persons will of

course gladly cooperate with the physician in his endeavors to relieve them or their friends, and from such he can often obtain a knowledge of facts that could not be discovered by his own researches, and in some cases information obtained in this way is as important as that derived from the careful examination of the observable symptoms and signs.

Many terms, besides those that have been mentioned, are employed in medical books, as expressive of some quality or relation by which symptoms are characterized. Thus, symptoms are designated as *local* and *general* or *constitutional*, which terms explain themselves; as *premonitory* when they appear as forerunners of disease; as *primary* or *idiopathic* when caused by the primary disorder, and *secondary* or *sympathetic* when produced by some secondary affection. *Diagnostic* symptoms serve to fix the character or name of a disease; *prognostic* symptoms foreshadow its future course or termination, and *therapeutic* symptoms indicate the course of treatment. The same symptoms may be at once diagnostic, prognostic, and therapeutic.

DIAGNOSIS.

Diagnosis is the act of determining the character of disease, and of distinguishing diseases from one another. It is either *general* or *special*. *General diagnosis* fixes the pathological nature of disease, and *special diagnosis* refers such disease to its seat, ascertains its extent, and determines its name or position in some nosological arrangement. To illustrate: You are called to a patient, and by applying the principles of general pathology to the case, you decide that he has an attack of inflammation; you have now made your general diagnosis; you then ascertain the seat of the inflammation, and having located it in the brain, you call it phrenitis; or if the lungs are the organs involved, it may be pneumonia, pleuritis, bronchitis, etc., according to the particular structure that may be inflamed. Your diagnosis may go further than this, and decide whether the inflammation is acute or chronic, sthenic or asthenic, etc.

In another case your general diagnosis determines a disease to be fever; then by special diagnosis you distinguish the fever as intermittent, remittent, or continued, and observe whether it presents a high or low grade, whether it is a primary disease or mere secondary affection, etc.

You perceive, then, that general diagnosis may be regarded

as a branch of general pathology, and that special diagnosis pertains more directly to special pathology and nosology. For the information by which you are to be guided in the former, you are referred to the principles of pathology, etiology, and symptomatology, which have formed the subjects of previous lectures, and which are more fully and systematically unfolded in the standard books; and instructions and directions in regard to the latter will be more particularly given in the lectures on special diseases that are yet to be delivered.

The determinations of diagnosis, whether general or special, are reached in different ways under different circumstances. In some instances all the characteristics of disease are so well defined that its nature, location and peculiarities are recognized as soon as the symptoms are known. When the symptoms are less definite, reference to ascertainable causes, predisposing and exciting, often serve to clear up obscurities. Clinical experience may, however, be requisite to enable the physician to form a definite diagnosis. He may need to observe the development or absence of other symptoms that may or may not appear after the present time; and he may need to see the response of the system to therapeutic measures, before his mind can fully determine the true nature or real seat of the disease.

Many diseases have symptoms in common, and it is one of the objects of diagnosis to *distinguish* one from another, or from several that bear some resemblance to it. The symptoms that serve to distinguish a disease from others are called *diagnostic*; and symptoms that are peculiar to a disease, that is, are found in no other under the same circumstances, are called *pathognomonic*, because they at once decide the nature of the case. A great variety of circumstances might be recited that tend to modify the result of diagnostic examinations, but this would occupy time without a compensating advantage, and I shall omit them.

Diagnosis is, therefore, aided by knowledge derived from every department of medicine. Anatomy, physiology, therapeutics, chemistry, and the recollections of previous experience in practice, are all laid under contribution to the important office of determining the nature of disease. But of all these, an intimate knowledge of pathology is the most signally important. Clinical experience may make a man an adept in special diagnosis and in the administration of medicines, but without pathological knowledge, his

practice must be chiefly empirical, and he must be liable to commit grievous errors in pursuing his routine of treatment.

The *object* of diagnosis is not merely to gratify a professional curiosity in ascertaining the internal changes of function and structure, nor to fix the class, order, genus, species, etc., of a disease, with a view merely to questions of natural history, as the geologist collects, studies, labels, and arranges his fossiliferous specimens. Diagnosis is of practical importance, both to the practitioner and the patient. Upon a correct diagnosis must depend in a great measure, the prognosis and treatment that are to follow; and the reputation of the physician, and the health, perhaps life of the patient, may be the forfeit of a mistake.

It is important to conduct a diagnostic examination according to a systematic method. This will prevent the physician's mind from becoming confused, and perhaps avoid repetitions and loss of time.

1. Let the patient relate his own case in his own way, without leading questions from the physician. Patients will often imagine they have experienced symptoms when suggested by the physician, which may not have existed at all.

2. In the meantime the practitioner may take a general survey of the exterior of the patient, observing the expression of his countenance, his color, posture, movements, voice, etc.

3. Institute a series of questions, educing the previous state of the health and habits of the patient, the history of the present attack, its probable cause, what has been done in the way of treatment, etc.

4. Examine by whatever means are at command, into the state of the vital functions, as the digestive; the absorbent; the respiratory; the circulatory; the nutritive; the secretory; the sensorial; the intellectual, emotional, and motor; and the reproductive functions.

5. He may then proceed, if necessary, to such exploratory measures as have already been described for ascertaining the physical signs.

As was remarked under a former head, all examinations, whether by interrogation or exploration, should be conducted with a delicate regard to the feelings of the patient, and care should be taken especially to avoid producing alarm or agitation, as that may in a measure defeat the object of the interview. I have known physicians to forfeit the respect, confidence, and patronage of patients by the inconsiderate manner in which they conducted such examinations.

PROGNOSIS.

By *prognosis* is meant a foresight of the *course, duration and termination* of disease.

The most important *object* of prognosis, as well as of diagnosis, is to determine the indications of treatment. We should endeavor to foresee the future course of a disease, that we may be able to interpose the necessary measures to obviate or mitigate danger, avoid being taken by surprise by unanticipated phenomena, and be prepared to seize the golden moments of opportunity in which our treatment may be most effectual. Anticipation of the probable duration of disease is important in enabling us to decide upon the general plan of treatment to be pursued. If we foresee that it may be cut short by remedies, we may be justified in adopting a very different course of management from that which would be required to sustain a patient to the termination of a disease, that must necessarily run a definite course or be greatly protracted. And the probable termination of a malady, when foreseen, may very much influence our treatment, and the communications to be made to the patient or his friends.

Prognosis is either *empirical* or *rational*, according to the kind of data upon which it is based.

Empirical prognosis is founded upon past experience or observation. The physician having seen cases with similar symptoms which he has determined in his mind to be *good* or *bad* signs, and looking to these symptoms alone, without regard to the nature of the disease or the chain of causes and effects that is to connect the future history and termination with the present state of the case, pronounces his prognosis. In many cases such a method of prognostication is reliable for certain purposes. The countenance, voice, state of the mind, strength, manner of breathing, condition of the skin, appearance of the evacuations, etc., will frequently enable even a non-professional attendant to say whether a patient is improving, growing worse or near his end. But in the average of cases that occur in actual practice, empirical prognosis is mere guessing at random, and serves no valuable purpose as a guide to a rational mode of medication.

Rational prognosis is based upon a knowledge of the causes, nature and symptoms of a disease, and its amenability to remedial measures. The evidence on which it is based, is required to be as clear and full as that relied upon in diagnosis. It even requires a more thorough appreciation of the pathological facts involved than

does diagnosis, for it not only requires that we know the nature, locality and name of the disease, but the state of the system in which it exists; the progress it has made; the tendency it manifests to advance and recede; the changes that must be effected by remedies to effect a cure or produce a favorable modification; whether we can command remedies that are likely to accomplish the desired end; and whether the necessary measures can be borne by the patient.

Let us briefly enumerate a few of the leading circumstances to be considered in the formation of a rational prognosis.

1. *The Patient's Age*.—In infancy and old age acute diseases are more fatal than in middle life, there being less vigor of constitution to sustain them. In old age there is a special tendency in most diseases to assume the chronic form.

2. *The Sex*.—In the female nervous disorder is more common and less manageable than in the male, but it does not augur so unfavorably in the former as in the latter. The state of the functions peculiar to the female is especially important. Regularity of the menses is favorable and irregularity unfavorable at all times. Pregnancy and lactation are unfavorable in fevers and especially in the exanthemata, but often temporarily suspend or retard scrofula, tuberculosis and other disorders of nutrition.

3. *The Temperament*.—Diseases are most apt to be acute and run a speedy course in persons of the *sanguine*, to be chronic with latent or obscure symptoms in the *lymphatic*, and to be characterized by prominent, exaggerated, and capricious symptoms in the *nervous* temperament.

4. *Previous Disease*.—If the same disease has occurred before, it may render a subsequent attack improbable or more mild, as small-pox, measles, etc., or more probable and more dangerous, as apoplexy, tuberculosis, cancer, etc. After scarlatina, albuminaria and dropsy are less dangerous than when produced by other causes, but rheumatism is apt to be very severe and stubborn when it follows that disease. Inflammations following continued fevers are apt to become chronic and produce organic lesions.

5. *Present Disease*.—This generally increases the severity and danger of any additional disorder. Structural disease, as of the heart, lungs, liver or kidneys, increases the danger from fevers and contagious diseases. Inflammation occurring during the existence of fever is more dangerous than under other circumstances. Some diseases are apt to arrest the progress of others.

6. *Previous Habits.*—Intemperate habits, whether in eating or drinking, and indulgence in excesses of any kind increase the danger of severe disease. Persons exhausted by privations, overwork, loss of sleep, or debilitated by close confinement, are not well able to sustain the depressing effects of fevers and other severe forms of disease.

7. *Condition of the System when Attacked.*—Weakness or exhaustion from any cause not only predisposes to disease, but increases the danger of serious disorders. In plethora, fever or inflammation is apt to present a high grade of symptoms.

8. *The Cause of the Disease.*—This if known often assists the prognosis, for the violence of disease generally bears some proportion to the intensity of the cause. Where malaria is very intense, an epidemic influence strongly marked, or infectious poison much concentrated, as in close rooms or filthy and unhealthy localities, the diseases they produce are generally severe.

9. *Situation and Nature of the Disease.*—If a vital part is involved and the disease is of a nature to arrest or greatly embarrass its action, the danger is great. Severe disease of the heart, lungs, brain and spinal cord, or kidneys can not continue long without endangering life. The more severe the morbid affection, and especially if it is likely to modify the structure, the greater the peril. Hence the fatality of inflammation in the vital organs. Spreading disease, as erysipelas, peritonitis, etc., and those that deprave the blood, as cancer, syphilis, etc., are extremely dangerous though occupying comparatively unimportant situations. The nature or situation of the disease may show it to be incurable.

10. *The Extent and Progress of the Disease.*—As a matter of course the more extensive an affection the more harm will probably come of it. Inflammation of an entire lung is fraught with more danger than that of one lobe merely, and double is much more fatal than single pneumonia. The rapid progress of severe disease points to a speedy event. The circumstances I am now considering may decide the question of recovery or a fatal result. Sometimes a disease may be considered curable up to a certain point in its progress. Ulceration of the bowels may be curable before, but is necessarily fatal after perforation.

11. *The Character of the Symptoms.*—Symptoms that evince re-active power in the system, or a tendency toward convalescence, are favorable. Diminution of pain or distress, return of appetite and natural sensibility, increase of strength, improvement of the pulse,

equalization of the circulation, quiet sleep, improvement of the secretions, etc., are under ordinary circumstances, favorable symptoms. What are called *critical* discharges, as profuse natural perspiration, or a large flow of urine, with a subsidence of sediment in it, and dark-colored alvine discharges after much torpor of the liver and bowels, may generally be considered favorable omens. Sometimes the cessation of pain is an alarming symptom, indicating a failure of vitality in the part. Symptoms that indicate impediment in one or more of the functions essential to life, as the circulation of the blood, respiration, nutrition, or excretion, are unfavorable. The danger to life is the more imminent in proportion as these vital functions are impaired; and by observing the extent to which one or the other of them is invaded, or is giving way, we may not only foresee the approach of death, but anticipate with some degree of certainty the mode of its occurrence.

The *course* of a disease has reference to the order of succession, and rapidity of its symptoms. Prognosis in this respect is based upon the general and special diagnosis of the disorder, the constitution of the patient, and the circumstances that surround him. The course of some diseases is intermittent, of others remittent, and of others continued. An acute disease runs a speedy course, and a chronic one is more slow in its progress, and manifests no tendency to a definite result. These terms however, as descriptive of the course of disease, are very indefinite. An acute affection may continue a long time, and a chronic one may be of brief duration. The former often terminates in the latter, and under the influence of an exciting cause, a chronic affection may assume an acute character. Examples of such alternations are often presented in rheumatism, neuralgia, etc.

Some diseases generally pursue a definite course, reach their acme at a given time, and then spontaneously decline and give place to convalescence, unless some untoward circumstance intervene, as the occurrence of inflammation, or other complicating disorder. Examples of such diseases are seen in the exanthematous and some other fevers.

Other diseases again tend naturally toward an unfavorable issue, and unless arrested by treatment, which is not by any means always possible, necessarily terminate in death. Of this character are hydrophobia, cancer, etc.

Where statistics show that a large proportion of cases of any

disease have proved fatal, the general prognosis of such diseases is said to be unfavorable. Thus, in cholera and yellow fever the *general* prognosis is unfavorable, though, owing to the mildness of the attack, the constitutional vigor of the patient, or the favorable operation of medicines, the *special* prognosis in a particular case may be favorable. The *general* prognosis is favorable in disorders that usually terminate in health, but the *special* prognosis in a given case may be unfavorable.

The *termination* of an acute disease may be convalescence or a return to health, the chronic form of the same disease, or death.

Convalescence may be speedy, or slow and tedious, according to the nature and seat of the disease, and the constitutional vigor of the patient when the disease terminates. Convalescence from some diseases is apt, under certain circumstances, to be interrupted by occasional *relapses* into the original disease, or by the occurrence of such other forms of disorder as are induced by the predisposition of the system, or by exposure to exciting causes. Many diseases, as small-pox, measles, scarlatina, etc., leave the system specially predisposed to general or local morbid affections, called sequelæ. Malarial fever, rheumatism, and inflammatory diseases generally, have a great tendency to relapse. The prognosis in relapse is generally more unfavorable than in the original attack, because of the debilitated condition of the patient and the vitiated state of the blood, although the disease may return with apparently less force.

In some cases disease leaves the patient irreparably injured in constitution,—full health never being regained, though life may be protracted for years. Sometimes a predisposition is entailed upon the patient that results in consumption, scrofulous disease, dropsy, anæmia, or cachexy, and a gradual or rapid decline, till death finally brings relief.

The transition from the *acute to the chronic* character, although often spoken of as one of the terminations of disease, is not really such, but the indefinite continuation of the same disorder in a modified form.

The termination in *death* may take place in one of three ways, depending upon the vital function that first ceases. In other words life may be terminated, 1, By death commencing at the heart, *syncope*; 2, By death commencing in the lungs, *asphyxia* or *apnœa*. 3, By death commencing in the cerebro-spinal nervous centers—*coma* or *paralysis*. Arrest of function in any one of these organs is speedily followed by cessation in the others, and w

all are suspended life is extinct. All may subside simultaneously, as in death from *inanition* or *asthenia*; but even then it will generally be observed that one fails before the others.

It is, therefore, by observing the symptoms developed in connection with the circulatory, respiratory, and nervous functions, that the approach of death is to be seen. Death by syncope, and death by coma or loss of sensibility in the brain, are attended with no pain, though there may even then be the appearance of agony from the reflex motor actions, and spontaneous contraction of muscles. But in death from asphyxia, whether by exclusion of air from the lungs or paralysis of the respiratory muscles, the sufferings of the dying are terrible in the extreme, until the nervous centers are deprived of their sensibility by arrest of the circulation of the blood.

Certain symptoms are generally relied upon as signs of the *gradual* approach of death. Sensation is gradually diminished; consciousness becomes more and more indistinct; the power of voluntary motion gradually fails; the involuntary movements become weaker and weaker; speech and deglutition become difficult or impossible; the blood ceases to flow in the capillaries; the pulse ceases at the wrist; the surface becomes pale or livid, the extremities cold, the luster of the eyes dimmed, the countenance shrunken and ghastly (Hippocratic); the chin falls; a collection of mucous causes the "death-rattle" in the air-passages; a clammy sweat breaks out upon the skin; a cadaverous odor may arise from the body; the breathing becomes feeble, perhaps irregular, and gradually ceases, and the patient passes away as if falling into a quiet slumber. It may be however, that there will be one or more apparent efforts at re-action. As the vital flame appears to be dying out, it may suddenly flash up again with more or less luster, and then gradually or suddenly become extinguished. Sometimes this final effort of the system is characterized by distressing symptoms, such as groaning, gasping for breath, convulsive struggling and distortion of the features, giving the impression of intense agony to bystanders; but it is believed that they are in most cases the result of the reflex, unconscious, nervous functions, and the inherent contractility of the muscles, and that patients who die in this manner are seldom sensible of suffering in their last moments.

LECTURES

O N

SPECIAL PATHOLOGY AND THERAPEUTICS.

LECTURE I.

ON FEVER.

General Description of Fever, Importance,—Definition ;—Symptoms in different Stages ; 1st, Forming ; 2d, Cold ; 3d, Hot ; 4th, Sweating Stage.

GENERAL DESCRIPTION OF FEVER.

As Fever is admitted to hold the first rank in point of importance in the history of medical science, as well as in a practical point of view, it is of right the first topic in a course of lectures on the Theory and Practice of Medicine.

Before considering the particular forms of Fever, our attention should be directed to the subject as a whole. With this, therefore, we shall be occupied this morning, reserving the details for subsequent lectures.

Definition.—According to the most modern and popular authorities, Fever is a disease in which all the functions of the system are more or less deranged, and of which the most striking phenomenon is a general disturbance of the nervous functions. Along with the irregularity of these functions we usually find increased heat, frequent pulse, disinclination for food, and a general dullness of the patient. It will be observed that these symptoms imply, in essence, a universal derangement of the organism. All the organs of the body are out of tune, and cease to perform their functions with the regularity and system essential to health, and the proper distribution of the vital energy ; but these evidences of universal derangement, it will be also observed, do not imply particular local determination.

We start, then, with the proposition, that nervous disorder, increased heat, frequent pulse, and disinclination for food, are the

leading symptoms characteristic of the great class of febrile diseases. It should be remembered, however, that these symptoms, although generally present, are not universally so. Excited pulse and hot skin are the *most* invariable symptoms in febrile cases; nevertheless, we meet with cases where both these symptoms are absent. Hence, we see the fallacy of relying solely on any special phenomena, as invariable and certain diagnostic symptoms. Many exceptional cases occur under circumstances which will be noticed in the discussion of particular forms of disease. In the cold stage of Fever, these two symptoms are often absent; and perhaps in a *majority* of instances they would not be recognized in the forming stage. As a general thing, however, on a careful examination, the skin on the body is found to be pungent and hot even in the cold stage, while on the extremities it is sensibly below the healthy temperature.

STAGES OF FEVER.

Four stages may be enumerated as comprehended by the general outlines of Fever: 1st, the forming stage; 2d, the cold stage; 3d, the hot stage; and 4th, the sweating or declining stage. By separately considering these several stages, you will the better retain all the phenomena of this group of diseases, and also perceive the great importance of the division. For were I to enumerate all the general symptoms of Fever, without regard to the difference of stages, I could not, without confusion, say where the characteristic symptoms may be considered diagnostic, and where they may be overlooked. But by making this division, we can clearly ascertain the particular symptoms, peculiar to each stage, separately; and these, taken together, will give you all the characteristics and phenomena of what is understood to be Fever.

1. *Forming Stage.* This stage rarely commences suddenly. It creeps slowly, insidiously, and almost imperceptibly upon its victim, while he is, perhaps, unconscious of any danger. Persons under the influence of the forming stage feel a languor and listlessness, and an indisposition to make any mental or bodily effort. This gradually increases, until they are finally admonished that they are "not very well." This stage continues for a longer or shorter period, depending on the natural resisting force of the system, and the concentrated influence of the cause that produced the attack. On the duration of this preliminary stage will greatly depend the intensity and obstinacy of the disease after it is formed;

for when it has been thus insidious in its approach, making gradual inroads upon the functions of the economy, and thus incorporating its causes with the elements of the system, its removal will of course be proportionately slow and tedious. But if the system yield readily to the influence and the disease be developed at once, unless it entirely overpower and soon forcibly destroy the animal functions, you will find but little difficulty in throwing it off. This is a matter of observation and experience at the bedside of the patient, which is probably not altogether compatible with the theory of the times. The foregoing are not the only symptoms accompanying this stage of Fever. A general soreness and lameness over the whole system, an "aching of the bones" throughout the body, as the patient will express it, is strikingly characteristic. Especially is this the case in our malarial fevers. At length a slight pain is experienced in the back, which, in some instances, extends through the whole vertebral column. Finally an occasional chilly sensation, and an inclination to draw up more closely to the fire will be manifested in addition to the other symptoms, even before the patient is fully conscious of being sick. When this symptom begins to develop itself, and the individual does get close to the fire, there is almost always a palpable increase of the same phenomena, and shortly the character of the disease is fully developed. In some instances, but not invariably, headache accompanies the preliminary symptoms. As I have already remarked, many of these symptoms may be entirely absent; nevertheless, I am giving you, gentlemen, the symptoms that, according to my observation, are very characteristic of the general group of diseases called Fevers. Accompanying this stage there is usually considerable restlessness at night; the sleep is unsound and the patient is disturbed more or less by disagreeable dreams; producing debility on rising in the morning. Lowness of spirits is a very common symptom. Persons who in health scarcely know what it is to be gloomy, find themselves depressed and low spirited, while wholly unable to assign any cause. These symptoms, characterizing the incipient stage of Fever, continue through an indefinite and varying period, usually, however, quite a number of days previous to the second stage, which we shall next consider.

2. *Cold Stage.* This we understand to be the positive development of the disease. It is the first decided step which convinces the patient that he is certainly sick; especially if he is

much accustomed to disease. He may during several days have experienced the symptoms of the incipient stage without regarding himself as indisposed, or even apprehending danger, and not till the rigors of the cold stage have commenced, it may be, will he acknowledge himself to be sick, and employ the means of cure.

The symptoms of this stage vary much in different forms of Fever, and in different individuals. In ordinary Chills and Fever the sensation is that of coldness, accompanied by slight rigors; in Typhus slight chills with occasional flashes of heat over the body characterize this stage; while in Ague, it is distinguished by an uncontrollable shaking, the motion of which is distinctly communicated to the bed. In many cases the chill is but slight and almost imperceptible; still by close observation it may be recognized. If there be no other manifestation, a careful examination of the fingers, will establish the presence of this stage, by the blueness of the nails and the shriveled appearance of the skin, owing to recession of blood from the capillaries. In other cases it is palpable to the most careless observer. The sunken appearance of the eyes, and blueness of the lips will unequivocally tell the real condition of the patient. The slight uneasiness in the back and limbs which commences in the forming stage is now developed into positive pain and distress, so much so in many cases, that the suffering in the cold stage is decidedly more severe than in any other. So excessively severe, sometimes, is the pain in the back, that the patient complains of it *alone*, and applications are necessary to give him relief. The suffering indeed is so great in some cases, that the patient sinks into collapse and dies in the first chill. At the South the second or third chill is often fatal; in the North this is less frequently the case, though it has occurred here also. Hence you see the importance, gentlemen, of understanding these different stages, so as to have a proper appreciation of the disease in all its modifications, and to know what remedies are applicable under the various phases which may be presented.

In this stage the pulse is frequent but small and depressed; in some cases hard, in others weak and compressible under the finger. In very severe chills it is scarcely perceptible. In a majority of cases it is tense, small, and thread-like, and very frequent, more frequent in fact than in the hot stage; for, as will be shown hereafter, it then generally becomes more full and bounding, but less frequent. Exceptions to these rules will, however, occasionally be found.

The capillary circulation, during the cold stage, is diminished. This is decidedly the case on the extremities, and more or less so on the entire surface, although the skin on the body may present a pungent heat. The face is pale, and, as I have before remarked, the toe and finger nails are blue. A return of the paroxysm, in some cases, can only be recognized by examining the fingers and toes.

In all cases you will find the respiratory system involved. The respiration is difficult and hurried, and the patient will request the doors and windows to be opened, even when suffering sensations of extreme cold. Nausea and vomiting are also very common symptoms of this stage, both in intermittent and remittent bilious fever. We often find these the only symptoms accompanying the cold stage, except the appearance of the extremities before described. You will often find this nausea, vomiting, and even purging, attending this stage of intermittent fever, very much to resemble cholera morbus. This should admonish you to be on the alert, for these symptoms may tend to mislead you. If you are called to see a patient who thus seems to be suffering with cholera morbus, it is important that you be able to distinguish between this disease and the similar symptoms attending the cold stage of fever. Your reputation rests upon your decision, and this you must arrive at by careful inquiry into the history of the case. Without a correctly detailed statement of the facts and symptoms which may have been gradually developed, you will be liable to run into the error of treating it as a case of cholera morbus; but if you learn and carefully consider the history of the case, you will most certainly it upon distinguishing phenomena, which will enable you to recognize the nature of the disease. Otherwise your patient may slip through your hands, and you be left to the unfortunate reflection that you have neglected to apply the means that might have saved the life of a fellow-being. If any of you have already assumed the responsibility of practitioners, you will, I doubt not, recognize a coincidence between the symptoms and circumstances I have given, and those which have occurred under your own observation.

Thirst is another striking symptom in the cold stage of fever. You might suppose that the hot stage would be marked by a greater demand for water than the cold, but the opposite is the case. There is, of course, thirst during the hot stage; but it is not so intense or importunate as during the cold stage. The mouth is not as dry in the cold, as it is in the hot stage, but it is clammy, and the patient experiences a constant desire for cold

drinks. There is also a general diminution of vital sensibility in the various organs of the body.

The continuance of these symptoms in different individuals is quite variable. In some cases they will continue only a few minutes; in others they will last for hours. In intermittent fever, the urinary secretion is increased in quantity, and almost destitute of color, in the cold stage, while in the hot stage it is high colored and has a very peculiar odor; the quality and quantity both being essentially changed in a very short time.

Such, in general terms, is the cold stage of fever. One after another, the characteristic symptoms gradually pass away, as those of the true febrile movement are introduced, until the patient, as it were unconsciously, throws off the bed clothes and the hot stage is gradually developed. The recurrence of the chill during the progress of intermittent fever, as a general rule, is as regular as the revolutions of time.

8. *Hot Stage.* We come now to speak of the Hot Stage. You now find a gradual return of the capillary circulation on the surface, and, apparently contrary to the ordinary principles of philosophy, more free and easy respiration, and a more calm and quiet condition of the system. The hands begin to swell; the veins become filled; the cheeks are flushed; the sunken and depressed appearance of the countenance is changed, and in many cases a bright and excited expression is observed; the intellect is often more sprightly than usual, and in many instances becomes excited to a condition of temporary insanity. The extremities become warm, so that instead of requiring hot irons or bricks to the feet, the patient will expose them to the cool air by removing the covering.

The pulse in this stage is exceedingly variable. It generally becomes more full and bounding, and less frequent. In some cases, however, it is hard and wiry; in others, soft and compressible, or open and expanded—varying in frequency from sixty to one hundred and twenty. In some cases the frequency is very much diminished, showing a low grade of vital force, which is not a favorable symptom; implying a slow and tedious recovery. A great increase in the frequency of the pulse is also an unfavorable symptom. A patient with the pulse at one hundred and fifty can not be considered in as good condition as one whose pulse is only one hundred and ten; still, there are persons possessed of peculiar idiosyncrasies, in whom a pulse of one hundred and fifty per

minute would not be an alarming circumstance. And it is important to understand these peculiarities of constitution in forming your prognosis of disease; to bear in mind these exceptions to the general rule; if you do not, you are liable to be misled. I shall attempt in these lectures, as far as my experience is drawn upon, to give you nothing but facts derived from actual observation in practice. Every practitioner has discovered phenomena which no one else has described; and these very facts are exceedingly valuable to the young physician.


When, from predisposition, peculiar organization, or the particular circumstances of the case, there is a great tendency to determination of the brain, the head becomes hot and painful, and delirium frequently occurs. In such cases there is an unusual throbbing of the carotid arteries, and this is sometimes so great that the patient will distinctly feel a sensible motion of his pillow. In this stage of the disease, if there be not depression of the vital properties of the nervous system, the sensibility is often increased to a degree that becomes exceedingly disagreeable and annoying to the patient. He becomes restless and uneasy; the pain in his back causes him to tumble from side to side, in search of an easy or more comfortable position. Or, he will complain of pain in the limbs and general restlessness. In high grades of fever there is often great wakefulness, if not entirely inability to sleep; while in low grades there is lethargy, and a constant tendency to drowsiness. For while the sensibility becomes thus exalted in high grades of fever, in low grades it becomes really blunted and depressed; so much so, indeed, as often to impair and sometimes actually suspend both general and special sensation. Smell and taste becomes blunted, and the hearing very much impaired.

In view of the foregoing remarks it will be inferred that, in this stage of fever, the vital functions generally are impaired, which is really the fact. Digestion is arrested; food is loathed, and if taken into the stomach remains there undigested, to the great inconvenience of the patient. Sometimes nausea, if not present in the cold stage, will manifest itself in this; but this an exception to the general rule. I have observed it in a few instances. As has been remarked, thirst is a usual attendant of fever, but exceptions occasionally occur. Generally, however, there is a morbid demand for water, and a moderate use of it will in no wise aggravate the disease; though a too free indulgence may cause a disagreeable sensation of depression in the epigastric region, if not nausea and

vomiting. All the Old School practitioners were formerly in the habit of forbidding the use of cold water in fever—a practice as barbarous as it is unnecessary. In many instances patients have been entirely relieved by drinking cold water: causing a *crisis* that you will see spoken of in your books.

The appearance of the tongue may have an important bearing in this stage of fever. While in some cases it is covered with a thick, clammy, white coat, in others the coat is yellowish brown; and in others still, the surface is red, or perhaps dry and parched; but these appearances will be referred to hereafter. I am now speaking of these matters in general terms, but when we come to speak of particular diseases, we will refer to them more definitely. In some cases the mouth continues moist, in others it is dry and parched; in some it is coated at first; in others, not till a more advanced period of the disease. I have seen cases in which the teeth became very early covered with black sordes. The condition of the bowels is as variable as the cases that present themselves for treatment. While in some cases the bowels are in a loose condition, amounting perhaps to diarrhea, in others there is obstinate constipation. Again, the bowels will be found in a perfectly healthy state, with a regular and natural evacuation every day. But usually all the secretions are deranged, which may be considered the general rule, and an opposite condition the exception. In some instances the skin is dry; in others the hot stage is accompanied by a profuse perspiration; the latter, however, is not of frequent occurrence. I have already referred to the urine, as being diminished in quantity and high colored; but more of this when we come to describe particular varieties of fever.

4. *Sweating or Declining Stage.* Upon this stage I shall not dwell at any considerable length. The fever gradually and almost imperceptibly declines; the skin becomes soft and moist; the urinary secretion becomes more copious; the pulse more free and compressible and gradually diminished in frequency; the patient becomes more quiet and calm; all the phenomena of disease disappear, and the patient is left in a condition of convalescence. Thus much for a general view of the four stages of fever.



LECTURE II.

ON FEVER—CONTINUED.

Crisis in Fever. Two General Classes of Fever, Symptomatic and Idiopathic. Causes of Fever; Broussais, Doctrine, Local Diseases only Secondary; Nervous System primarily affected; Secretions and Circulation affected Secondly;—Typhoid differs; Secondary Disease may become paramount; Violence of Fever depends in part on Cause; Miasmata—What are they? How produced, Where they prevail, In what seasons.

CRISES IN FEVER.

Our last Lecture was mainly occupied with the general phenomena of Fevers, and I would direct your attention for a few moments longer to the same subject. We had proceeded as far as the last stage of Fever, which brought us legitimately to what has heretofore been called the *Crisis*. Most authorities have taught the doctrine of critical days; or, that Fevers have a period in their progress where there is a special tendency to a favorable or unfavorable result, termed a *Crisis*. In Intermittent Fever this is strictly true, as regards a single paroxysm. It is quite reasonable to suppose that those diseases, also, which are produced by specific causes, are uniform in their different stages, and run a regular and definite course, should have a natural crisis. In contagious diseases this is found to be the case, but it can not be said of other forms of Fever, so far as my observation has extended. A single fact may suffice to settle this point. We now know, as certainly as we know that Intermittent and Remittent Fevers exist, that they can be arrested in a very short time, or that they may run on to an indefinite period; much beyond the time laid down as their natural duration. This is sufficient, in my view, to settle beyond the possibility of a doubt, that so far as these forms of Fever are concerned, they can not be considered as having a crisis, or as necessarily tending to a change, favorable or otherwise, at any stated time.

GENERAL CLASSES OF FEVER.

I will now proceed to speak of the different varieties of Fever. They are, in the first place, divided by the authorities into two general classes, namely: *Symptomatic* and *Idiopathic*. I refer to this, at the present stage of our course, for the purpose of clearing away the rubbish that has accumulated around the subject, that I may more clearly set forth the doctrine of Fever properly so called. Symptomatic Fever is not really entitled to be classed with febrile diseases, but belongs legitimately to the subject of inflammation. It is universally considered to be the result of local disease, which is the real disease; while the fever is only an attendant symptom. It is not therefore strictly entitled to be regarded as a *Fever*. But since this division has been so generally made, I think proper here to explain what is understood by the terms, remarking, however, that it is not a distinction which will be observed hereafter.

Symptomatic Fever then, is one which results from a local injury or inflammation of one or more organs of the body: as the lungs, liver, stomach, etc.; while Idiopathic Fever is independent of particular local disease or determination. This subject will be referred to again, when we come to speak of Inflammation.

CAUSES OF FEVER.

The doctrine prevailed at one period in the history of medicine, that local inflammation was an invariable attendant on all forms of Fever; or in other words, that Fever was only a symptom, and not a disease itself. This was the doctrine of M. Broussais. He located the cause of Fevers in the gastro-intestinal mucous surfaces, and to them he looked for the origin of every phenomenon of Fever, whether Typhus, Yellow, Bilious, or any other form. This theory was denominated the doctrine of the Solidists, in contradistinction to its antagonist theory, that of the Humoralists.

Broussais held that the solids of the system played the principal part in local inflammations; and he did not believe that the fluids had much to do in bringing about the disease, though he admitted they became secondarily affected, and might bear an important part in its continuance.

I have no idea that the Fevers of our Western country, or those of a similar character met with in other parts of the world, are produced by *local disease*. True, inflammation of the liver,

spleen, mucous membrane of the stomach and bowels, or other organs, may be attendant on malarial Fever, but that this local disease is the cause of the Fever, or essential to it, I have seen no reason to believe. The primary impression of the malarial poison producing these Fevers is made upon the nervous system, invariably causing an essential derangement of the nervous functions. That this is the primary or initial step in the Fevers to which I particularly refer, I hope to establish with satisfactory certainty. In observing these Fevers, we uniformly find, first, that the sensorial functions are impaired; secondly, the secretory functions are vitiated; and thirdly, the functions of the circulation are deranged. By careful attention you will observe that these circumstances come in as constant attendants upon each other in the order just stated. Where inflammation has occurred in any organ predisposed to that form of diseased action, it will generally subside when the primary disease is removed. We see, accordingly, in an individual with Remittent Fever, accompanied by inflammation of the spleen or of the liver, when the Fever is relieved (which generally is easily done if properly treated), the phenomena of the local difficulty readily and promptly subside. This I have seen in hundreds of cases where unmistakable symptoms of local inflammation existed. But if the general febrile disease be allowed to continue till the local and secondary organic derangement becomes the paramount one, as it does in some cases, the whole train of morbid action will not entirely disappear with the decline of fever. Yet it will be found that the means properly employed to arrest the fever, will not in such cases, in any degree aggravate the local difficulty, and that the latter may be readily controlled by judicious treatment. An instance of this form of reflected disease, though it may not be connected with malarial fever, may be cited as an illustration. I refer to inflammatory rheumatism. No one supposes that the local inflammation, found in the ankle or wrist of the patient, having general symptoms of rheumatic disease, is the primary difficulty, and the one to be treated with a view to cure; but, by the use of remedies appropriated to the primitive disease, the reflected irritation may be seen to subside as if by magic, together with the accompanying febrile symptoms. But we have seen the reflected inflammation as in chronic rheumatism, as well as in other diseases, become the paramount difficulty; so that the removal of the primary and general disease from the system, would not relieve the local affection. This, however

if ever occurs where prompt and appropriate general treatment has been employed in the acute stage; but as before stated, the local inflammation, instead of becoming chronic and fixed, passes off with the general symptoms.

All the fluids of the body necessarily become deranged in the progress of protracted fevers. The secretions are all disturbed, and the effete matter which should be thrown off by the excretory process, is retained in the system and becomes a source of disease. That large amount of waste material, which in a healthy condition passes off through the skin, the kidneys and the bowels, is retained, to irritate the organs and derange their natural functions. It is therefore apparent that the blood must become essentially vitiated. Now, to prove the position I have taken in regard to the fevers of this country, and all idiopathic fevers in all parts of the world, a reference to the symptoms is all that is necessary. The gradual succession in the disturbance of the functions is essential to this point. Those symptoms characteristic of the forming stage, such as aching of the limbs, restlessness, debility, disinclination to exercise, and pain in the back, all go to prove beyond the possibility of a doubt, that the nervous functions are the first disturbed. Very generally, it is true, organic disturbances, perhaps nausea and vomiting soon follow, but not invariably. The liver, even, is sometimes found undisturbed, performing its functions with regularity, though it generally becomes affected at an early period in the progress of these fevers. Constitutional idiosyncrasies and other circumstances cause differences in this respect in different cases. It is, therefore, evident that structural disease of the organs is not necessarily present in the incipient stage of fever; that it is not the cause, but merely an effect of the disease. Another very important fact bearing upon this point is, that you can cure nine cases in ten of these Western fevers without a single dose of medicine which shall act specifically upon any of these organs; without either emetic or cathartic, cholagogue or diuretic; showing most clearly that the local affection is not the cause that produces or keeps up the fever. The cure evidently depends on the removal of the cause which is operating on the nervous system.

It is, therefore, to my mind clear beyond all question, that the form of fever under consideration does not result from, nor depend upon any local organic disturbance by which it may chance to be attended, but that its seat is in the nervous system, and there alone can be found. There is yet another fact, which, if needed,

might be cited, confirmatory of the conclusion at which we have arrived. I now refer to the fact which all have observed, and which the authorities fully recognize, that during the apyrexia of intermittent fever the patient usually enjoys a comparative state of health, as nearly perfect, indeed, as could be expected under the circumstances, were all cause of disease entirely removed. The secretory functions are resumed and performed in a natural manner, digestion goes on properly, and for a day or two the patient feels free from all symptoms of disease, goes about his daily avocation, and could he continue in this condition a few days, would doubtless attain complete health. Now does any one suppose that there is local disease apart from the nervous system which produces these phenomena? Is it not conclusive that the position I have assumed is positively the true one?

The fevers under consideration are the *malarial*, especially of the Western country; though such fevers, characterized by the same phenomena, and equally fatal, are endemic in many other parts of the world. The observations I have been making do not perhaps strictly apply to typhoid fever, which is, as I believe, produced by a different kind of malaria, is subject to somewhat different laws, and exhibits in its progress, when fully developed, a train of symptoms dependent no doubt upon local disease. Such may be the case too with our remittent and congestive fevers; for as I have said, the local disease may become the paramount one. The disease of the liver for instance, may continue after the original malarial fever has subsided; or the course of treatment instituted in the early stage of the fever may so operate on the mucous surface of the stomach and bowels as to set up a local irritation that will continue to produce fever, long after the primary disease has been removed. The subject of typhoid fever we shall discuss hereafter. It is supposed to be produced by *idio-miasma*, or animal poison, and there are interesting facts connected with the history of the disease, which have an important bearing on its treatment. I will, however, make the remark, that the doctrine of Broussais before referred to, although in the main positively false, did work a salutary modification in the modes of treatment for typhoid and most other forms of fever: substituting a mild, soothing, gentle course of treatment for the previous practice, which had sacrificed more lives than the fevers would probably have destroyed without medication.

The violence of fever is generally proportionate to the extent

or intensity of the cause which produced it. Thus, in slight local injuries we expect little difficulty to follow, while from more severe lesions we anticipate corresponding severity in the sympathetic fever. So in idiopathic or malarial fever, where the intensity of the cause is slight, we find the fever slight; but where the malarial poison is more concentrated, we meet with fevers of greater violence. Hence, at the South, where vegetable miasma is not only more general, but more concentrated or intense, we should naturally expect to find the most severe and fatal forms of fever; and it is there, that malignant, intermittent and congestive fevers prevail.

MIASMATA.

I desire too to much occupy a few more moments in considering the causes of fever, before speaking of the different varieties, that I may the better explain the divisions which should be made in classifying these diseases. I recognize but two causes of idiopathic fever, the vegetable malaria or koino-miasmata, and the animal malaria or idio-miasmata. These two causes may exist separately and produce different phenomena, or they may operate together, producing a combination of their peculiar symptoms. Thus we have many cases of well marked intermittent fever, accompanied or immediately succeeded by the train of symptoms peculiar to typhoid.

It has been observed in some regions of country that certain diseases prevail in particular seasons of the year. It has been observed also that at those seasons of the year when certain kinds of vegetable matter abound, particular forms of disease are developed. Still, all the examinations of the atmosphere which have been made, have failed to discover the real nature of malaria. It is true that M. W. Boussingault claims to have discovered, by the action of sulphuric acid, animal matter floating in the air, in districts where intermittent and remittent fevers were prevailing; but from what it emanated he could not determine. The fact would, it seems to me, raise strong suspicion that this animal substance consisted of infusoria, arising from decaying vegetable matter. Since the announcement just alluded to, other circumstances have been shown to exist, which go to prove that this animal matter holds to the disease there prevalent the relation of cause to effect. Experiments also prove beyond dispute that in the decomposition of vegetable matter, animalculæ are produced in the most rapid succession; having an exceedingly evanescent existence. Whatever may be

the vegetable decomposed, wherever it may be placed, and whatever the attendant circumstances connected with the process, so far as microscopical investigations have discovered, it is impossible to produce vegetable decay without developing animal life. *

Now these animalculæ, although they swarm in the atmosphere and are inhaled at every breath, are as imperceptible to any of our senses, as if they had no existence. This, together with the fact above mentioned, that animal matter has been detected in the atmosphere in some malarious districts, seems to strengthen the suggestion that the cause of these periodic fevers exists in the atmosphere in the form of animal poison. The treatment of these diseases also strongly sustains this doctrine, and while taking a comprehensive view of the whole subject, I can not avoid a conviction that there is truth in it.

The circumstances necessary to the production of this miasma are well settled. A certain degree of heat and moisture is requisite, for otherwise vegetable decomposition can not take place. Hence, we can predict with some safety in the early part of a season, whether or not malarial diseases are likely to prevail. When we have an immense growth of vegetable matter, we anticipate a sickly season, and under circumstances favorable for vegetable decomposition, such will be the case; but if a state of the weather adverse to such decomposition follows, the season will certainly be healthy, as regards malarial diseases. This is in accordance with the observations of the most watchful physicians, and decidedly agrees with my own experience. For instance: I have seen in the early part of the season a vast amount of vegetable growth in particular localities where intermittent and remittent fevers were apt to prevail, and anticipated much sickness; but upon the occurrence of a drouth, or of a series of heavy rains keeping vegetation submerged, a remarkably healthy season succeeded. You are aware that vegetable matter excluded from the air, even under water, will not undergo decomposition. I have seen a log taken out of water where it had lain for twenty years, with the bark as perfect as when it was put there. Vegetable matter, then, will not decay if submerged in water by heavy and continual rains. So if we have a very wet season, sufficient to cover the surface of the earth in the low marshy lands (where there is always the greatest profusion of vegetation in settled countries), we will have a healthy

* I do not know upon what Prof. J. based this assertion, and tho at liberty to erase the sentence, I must express the opinion that it is

season. Now, I would ask, should not these facts, which have been noted by the most careful observers, have an important influence upon our minds in the formation of opinions on this subject? But still further observations have been made. If we have this immense growth of vegetation, and in the early part of the season a long drouth comes on, accompanied by much heat, sickness will prevail until the water is evaporated, and the surface of the earth becomes dry; when the sickness will subside and the remainder of the season be healthy. Another circumstance is known to exert a serious influence upon the general health of certain sections of the country. I refer to excavations for railroads and canals, especially upon the borders of rivers. Here is thrown up a large amount of vegetable matter partially decayed, and according to the views presented, we should look for a prevalence of malaria, and under such circumstances intermittent and remittent fevers invariable occur. So also upon the borders of ponds and reservoirs of water, as long as they are full the general health is not affected by them; but as soon as they are drained, and the vegetable matter exposed to the atmosphere and rays of the sun, the miasmata rise, and as far as the atmosphere is impregnated with them this form of disease prevails. Dr. Ferguson, a celebrated English physician, has made observations which it is claimed, oppose this position; but the attendant and surrounding circumstances are entirely omitted in the argument, and the facts which are given, seem to prove the reverse of the position assumed by him; and I think when his reasoning is carefully analyzed, it will not militate against the views I have advanced. We have all I suppose, heard of the draining of those great reservoirs in Northern Ohio, producing in neighborhoods on one side of them a great amount of disease, while on the opposite side it remained remarkably healthy. This is evidently owing to the fact, that during the decomposition of vegetable matter, and consequent generation of miasmata, the wind blew so as to spread the malaria over that part of the country which became unhealthy. Many instances of this kind have been observed in different parts of the country. Another thing is worthy of notice. I have already referred to the fact that a degree of heat as well as moisture is requisite to vegetable decomposition, so that if either heat or moisture be absent, vegetable decay will be prevented or arrested. I believe it has been found by minute observation that such decomposition does not occur at a temperature below sixty degrees F. Hence, it is said in the South, when

frost occurs in the autumn it stops the prevalence of disease. Indeed, I well recollect how anxiously I watched for the first frost before I had learned to arrest intermittent and remittent fevers with promptness and certainty; as I always expected to find my patients much better on the morning after its first appearance.

We have now perhaps occupied sufficient time on the general principles of fever; in my next lecture we will enter upon the consideration of Special febrile diseases.

LECTURE III.

MALARIAL FEVERS.

Classification of Fevers: True Classification suggested, Old Names Retained; Intermittent Fever, Types, Varieties, Stages: 1st, Forming; 2d, Cold; 3d, Hot; 4th, Sweating; Modifications.—Neuralgic Affections, Sun Pain, etc.—General Remarks, Paroxysms may occur Day or Night, Wearing out Ague, "Ague Cake," Tendency to Relapse.

CLASSIFICATION OF FEVERS.

At the close of the last lecture we were speaking of malaria as a cause of fever; and the same subject will occupy our attention for a few moments this morning, as a basis of Classification.

I have already referred to the two kinds of miasma,—the koino and idio-miasmata, and would here remark, that all forms of disease, properly ranged under the title of fever, may with safety be referred to one or the other of these two descriptions of malaria as the primary cause. And I believe that a division arranging fevers into two classes, as, for instance, "Those caused by Koino-Miasmata," and "Those caused by Idio-Miasmata," would in reality conform more to nature and to the facts met with in actual practice, than any classification which has been made by writers. Any modifications or anomalous manifestations connected with individual cases, would be readily explained by reference to the concentrated state of the malaria, the idiosyncracies of the persons affected, or other modifying circumstances connected with each case. It is very difficult, however, to find a term which will express the whole character of a disease, or to adopt a plan of classification which will conform in a satisfactory manner to the varieties of cause and pathology; and as an effort at a new classification of fevers might lead to some confusion, without a compensating advantage in the promotion of practical science, I shall in treating of fevers adhere to the divisions adopted in the books. I will, however, here remark once for all, that I do so for conve-

nience' sake merely, believing at the same time that the only real and proper distinction which in accordance with truth and science ought to be made, is that above indicated,—dividing fevers into two general forms or classes, having reference to the causes which produce them.

We shall, therefore, consider four varieties of malarial fever,—Intermittent, Remittent, Continued or Typhoid, and Yellow Fever.

I. INTERMITTENT FEVER.

This form of fever is vulgarly known by the several names of Ague and Fever, Fever and Ague, Chill and Fever, and perhaps some others. It is characterized by febrile paroxysms, recurring at regular periods, and the entire absence of fever or other symptoms of disease during the interval between the paroxysms. The period intervening between the end of one paroxysm and the commencement of the next, is called the *intermission*, or *apyrexia*. The whole period, comprehending the space of time from the commencement of one paroxysm to that of the next is by some authorities called the *interval*,—a term which is certainly very exceptionable, in view of the strict definition of the word. Other authorities apply the term *revolution* to the same period, which I regard as much better, and shall therefore employ it. The *type* or *rhythm* of intermittent fever has reference to the time occupied by one *revolution*; hence, we have ordinarily three types or varieties of this form of disease: the Quotidian, Tertian, and Quartan. In the Quotidian type, the paroxysm occurs regularly at the same time every day; in other words, its *revolution* embraces a period of twenty-four hours; the paroxysm of the Tertian type occurs every alternate day, the revolution occupying forty-eight hours; while the Quartan has a revolution of seventy-two hours duration, its paroxysm recurring once in three days. The terms tertian and quartan are incorrectly applied in this case, but as I do not desire to be captious, I shall for the sake of brevity and to prevent confusion, follow the books in this particular. In addition to these three, some other types are mentioned in the authorities, such as the Quintan, Sextan, Septan, etc., but these are very rarely met with in practice, and I merely refer to them in passing. There are, however, modifications of the three leading types above described, which you will meet with very frequently in practice. These modifications have reference both to the severity of the paroxysms and their periodical return.

The *Quotidian* type may be found occurring twice a day, morning and evening, requiring a corresponding difference in the treatment; as you may arrest the morning or evening chill, and still the other may continue every day, unless specially treated. This modification may with propriety be termed a *double quotidian*.

The *Tertian*, also, sometimes assumes a double character, the paroxysms occurring every day; and this modification you may mistake for the quotidian type, and treat it accordingly. But when you have arrested one part of the disease, or one paroxysm, the other will continue as though you had done nothing. The *double tertian* may, however, be distinguished from the quotidian by the paroxysms occurring at different hours on alternate days; by an alternate difference in the severity of the paroxysms, or by a combination of both these peculiarities. The *Quartan* type is also sometimes double.

There are other modifications of this disease, which it is important to bear in mind; among which is the *Anticipating Ague* and fever. You will frequently be called to prescribe for ague, apparently of the quotidian type, where the chill comes on regularly one or two hours *earlier* every day than it did on the preceding day; and unless you take this fact into consideration, you will allow your patient to have one more chill than is necessary.

In fact, it is highly important, as was remarked in a former lecture, in studying any disease, to learn every thing you can pertaining to the case. You should ascertain, if practicable, every minute particular respecting its history, that you may know how to adapt your remedies: for by prescribing without understanding these peculiarities, you are very liable to fail in arresting the disease; whereas, if you look carefully into these matters, you may be able to arrest it without difficulty. When I come to speak of treatment, I will refer more particularly to this subject.

The *Deferring Ague* is another modification of this form of disease, in which the peculiarity is precisely the reverse of the last,—the chill recurring at a *later* hour on each succeeding day. This, although of less practical importance than the variety just described, deserves to be noticed, as it influences in some measure our prognosis; for while the anticipating form is regarded as unfavorable, the deferring type is looked upon as a favorable characteristic, since the latter frequently runs itself out, or terminates in the tertian type, which is less formidable, and usually less severe than the quotidian.

There is another modification with which you will meet in practice, characterized by an irregular return of the paroxysms, and which is called *Erratic Ague*. This is a still more difficult variety, owing to its being usually associated with some local difficulty. Of this I will not, however, further speak at this time, having mentioned these several modifications and peculiarities, as exceptions to the general and regular types of intermittent fever usually encountered in practice, and not for the purpose of introducing in this place any special directions as to treatment.

We come now to consider the different stages of intermittent fever. In a previous lecture I mentioned four stages as pertaining to fevers generally, but one of these,—the forming stage,—had reference merely to the premonitory symptoms common to all varieties of fever. The other three stages, although manifested in a greater or less degree in other forms of fever, may be regarded as belonging legitimately and specially to intermittent fever, being developed in a very remarkable manner in each fit or paroxysm of this disease. These three stages are the Cold, the Hot, and the Sweating stage. They generally, as I have already said, succeed each other in regular order, and they are preceded as in other forms of fever, by the incipient or forming stage described while speaking of Fever generally. A few additional remarks may perhaps be proper here in reference to this stage.

1. *Forming Stage.* There is nothing peculiar in the symptoms of this stage in intermittent fever beyond what was said in my general remarks on Fever. The natural duration of this stage is very variable, and it terminates in the cold stage. This, however, is not necessarily the case, for this, as well as most other forms of fever may be arrested by proper attention, in the forming stage, without the development of the other stages at all. Cessation from labor, keeping within doors, restriction to a simple and digestible diet, with the administration of a cold infusion of boneset three or four times a day, and a hot foot-bath on going to bed, will usually be sufficient to avert an attack of ague or other form of periodic fever, in the forming stage.

2. *Cold Stage.* This stage is characterized by more palpable and definite symptoms than the forming stage. The patient feels an inclination to yawn and stretch, with a sense of chilliness "creeping up the back." In many cases this chilliness is scarcely perceptible at first, but increases gradually until it is clearly recognized: it also extends to the limbs. Now an aching in the

and perhaps in a majority of cases pain in the head begins to be experienced; and in some instances there is a sensation as if cold water were thrown upon the whole body. Presently there is a trembling, sometimes in one set of muscles and sometimes in another, and the aching in the body increases. The pulse becomes excited, small and frequent. The capillary circulation diminishes over the entire surface, especially on the extremities,—the skin assumes an appearance similar to that of a picked goose, called *cutis anserina*; the teeth chatter, the lips become blue, and the countenance has a shrunken appearance. The nails become decidedly purple, both on the hands and feet, and the fingers so diminished in size, that if the patient wears rings which before fitted closely, they may possibly drop off on placing the hand in a position to permit it. The tongue is usually pale, and there is a dry sensation in the mouth,—not parched as in the succeeding stage; but it is accompanied by insatiable thirst, more so even than that experienced in the hot stage: and it is remarkable that cold drinks do not increase the sensation of coldness, nor hot drinks diminish it. In fact, the more nearly the patient draws up to the fire, the greater will be his feeling of coldness: for while one side may be burning, the other will feel as if freezing. The urine becomes pale and copious.

During this stage there is always an irritated condition of the nervous system, as indicated by the neuralgic pains in every part, and by the moroseness and mental irritability of the patient. The breathing is oppressed and labored, and a sense of suffocation is frequently experienced. These various particulars constitute the principal symptoms, ordinarily, of the cold stage of intermittent fever.

There are, however, many variations in different cases and at different seasons of the year. Sometimes the cold and shaking are very severe, at other times almost entirely absent. In cases of the latter description, however, a careful examination will detect coldness in the ends of the fingers and nose, with a blueness of the nails, which are often the only symptoms of chill. The reaction during the next stage is generally in an inverse proportion to the intensity and duration of the chill: if the latter is slight, you may anticipate a great degree of vascular excitement to follow; whereas, after very severe and protracted “shakes,” there will be comparatively little fever. In all cases reaction comes on gradually, the symptoms of the cold stage passing off by almost imper-

ceptible degrees, until the patient becomes easy and quiet, in the commencement of the

3. *Hot Stage.* From the state of rest and comparative calmness just described as terminating in the cold stage, the symptoms of reaction become gradually developed. Respiration becomes more free and regular, but more hurried than in the cold stage; the pulse rises in strength and fullness, becoming more open and less frequent; the skin becomes warm and the capillary circulation free, and all the characteristics of febrile reaction are, finally, developed.

This stage like the preceding is very much varied both in duration and intensity,—being generally, as before remarked, proportioned inversely in both these respects to the chill by which it has been preceded. In many cases the fever continues nearly to the commencement of the next chill, so as to approximate the character of a remittent fever, the only difference being a distinct intermission of the fever, instead of a mere remission as seen in the latter form. In fact, cases frequently occur in which a well marked intermittent degenerates into a remittent, especially under injudicious treatment; while by prompt and appropriate means, a remittent fever if not at once arrested, may be made to assume the less obstinate form of an intermittent.

In the hot stage, the thermometer will indicate a positive increase in the temperature of the body, often rising from 98 to 110 degrees. You may, indeed, easily recognize this increase of heat by the sense of feeling. The pulse is exceedingly variable in different individuals, its frequency being greatly increased in some, while in others it is but little affected in this respect, though you will always find it more open, full and bounding than in health. Restlessness is another symptom of this stage; for though the pain in the back and limbs is less severe than in the cold stage, it still exists, producing much uneasiness. The patient, in this stage, sometimes becomes delirious, and unless you are careful you may mistake this as evidence of inflammation of the brain; and here again you see the necessity of carefully inquiring into the history of the case; of learning how the patient was taken, and if possible, the cause of the disease. The secretions are all diminished in the hot stage; the skin becomes dry, harsh and husky; the urine is diminished in quantity and essentially changed in quality, is high-colored, and does not deposit a sediment on cooling, as it will in the sweating stage. The mouth is dry and husky; the tongue

sometimes becomes parched and cracked, presenting a red and dry appearance. In some cases there is diarrhea and in others the most obstinate costiveness, while in others we meet with all the symptoms of cholera morbus. In children, convulsions often occur during the cold or hot stage. Hence, if called to see a child in convulsions, you should ascertain whether or not the attack was preceded by a chill. If you do not take the precaution to learn the history of the case, you may attribute the convulsions to worms or some other cause different from the true one; and thus subject the patient to unnecessary treatment, leaving the real disease untouched. If convulsions occur during or after a chill, your measures will be directed first to palliate the present difficulty, and then to interrupt the next paroxysm.

The symptoms of the hot stage gradually subside, and it is succeeded by the

4. *Sweating Stage.* The skin gradually becomes more soft and natural and finally moist with perspiration; the tongue is less dry and thirst less urgent; the patient becomes calm, and is perhaps disposed to sleep. The urinary secretion is less highly colored and deposits more or less sediment, which differs much in different cases. The moisture of the skin increases until a copious perspiration more or less free is established, and this continues until all the febrile symptoms are entirely gone. The pulse becomes natural and the patient is restored to comparative health. This constitutes a paroxysm of intermittent fever.

I have referred to many exceptions to, and variations from, the usual course of this disease while describing its several stages; and other modifications might with propriety be mentioned in this place. I have seen cases in which the hot stage was entirely wanting, the patient passing from the cold immediately into the sweating stage. I have seen other cases in which the sweating stage was absent, the skin merely becoming soft and the pulse being diminished. Sometimes the only marked symptom is a well defined nettle-rash, preceded perhaps by a slight chill, and occurring with as much regularity as the paroxysms in any case of intermittent fever. The first case of this description that occurred under my observation was that of a convict in the Ohio Penitentiary, while I was physician to that institution. He had been in the prison for some time when he was taken with a nettle-rash; the whole surface being covered with an eruption resembling hives. I administered a cathartic and left him. On calling the next day he

was about his business; but on the succeeding day at the same hour the former symptoms occurred. Supposing it might arise from some irregularity of diet or gastric irritation, I gave him another mild cathartic and awaited the issue; for I suspected the presence of malarial influence and was determined to test it. With the return of the next period came the same symptoms. Since that time I have seen other similar cases, though some of them were complicated with bilious fever. Only a few days before I left home, a friend of mine had an attack of this kind; and you will probably be surprised to hear that I gave him large doses of quinine and iron when his pulse was beating 120 per minute and his skin covered with an eruption; yet such was my prescription, and the result was a prompt and thorough cure. I should remark, that in this case there was a high grade of fever, with daily remissions, during which the eruption would partially recede and the febrile excitement in a measure subside, though the pulse retained the frequency above stated; and during this remission the medicine was administered.

There are other modifications of intermittent disease, which have very properly received the name of "masked ague," evidently arising from the same cause, and amenable to similar treatment with unequivocal intermittent fever. The most common of these anomalous intermittents, is that neuralgic affection familiarly known as "sun pain." You are called to see a patient suffering with severe pain in one side of the head, and from its intensity and the excited pulse in the carotid arteries, you may take it for inflammation of the brain and treat the case accordingly. Your remedies, however, are ineffective, and in fact active depletion may do serious mischief. A careful examination of the history of such a case will soon satisfy you that it is an attack of ague. You will discover the intermittent periodicity of the pain, its neuralgic character, and possibly may detect an incipient chill or other symptom, however slight, which may go to define the nature of the affection. Now instead of subjecting your patient to the inconvenience and perhaps injury of treatment for inflammation of the brain, you will palliate the present symptoms and prevent another recurrence, by antiperiodic remedies. I trust you will pardon me, gentlemen, for so frequently urging upon you the importance of careful investigation and discrimination in the treatment of disease. My sole object is to give you the advantage of

experience which I have derived from long and careful observation.

Although the affection just referred to is commonly called "sun pain," I have never been able to discover any propriety in the term, for it is just as likely to occur at one time of day as another. I have known it to occur at sun-rise, at noon, in the evening, and even at midnight. The pain may be confined to one side of the head, or it may extend over the entire head; it may be most intense in or over one eye, in the face, or in a single tooth, and in all these cases it will return and depart as regularly as the paroxysms of chill and fever. I remember the case of a lady in whom the pain was confined to one eye. She was subjected to salivation, cupping, etc., but the eye suppurated, burst, and was lost of course. I learned the history of the case and became satisfied as to the true nature of the disease. She afterward had a similar attack in the other eye, which was completely relieved by antiperiodic treatment.

Under the term "masked ague" may be embraced various other neuralgic affections characterized by periodical paroxysms or exacerbations. The pain may be experienced in the limbs, back, chest, stomach, uterus, or any part or organ of the body. The pain may be the only manifestation of the disease, or it may be accompanied by functional derangement of the particular organ affected. Thus the uterine system may be the seat of this peculiar affection, and amenorrhœa, dismenorrhœa, or uterine hemorrhage may be the consequence. A neuralgic affection of the chest is sometimes characterized by periodic bleeding from the lungs, corresponding with the paroxysms of the pain. I have also seen a very interesting case, where a young lady suffering under protracted dyspepsia, with slight gastralgia, and other symptoms evidently periodic, was completely relieved by the use of the appropriate treatment for "masked ague."

It may be remarked that the paroxysms of intermittents do not as often occur in the night as in the day-time, yet they are by no means confined to the day, for we have seen them occur at all times of night from sunset to sunrise. You will also find taught in your books a doctrine which I do not believe is verified by correct observation: that is, that particular types of the disease generally occur at certain times of the day. Thus it is said that the quotidian type occurs early in the morning, the tertian about noon

and the quartan in the afternoon. There may be some tendency to such a rule, but the instances of variation are so frequent, as every one's observation will soon prove, that no practical reliance can be placed upon it. I have seen the quotidian occur as frequently in the afternoon as in the morning, and so of the others; so that although the doctrine is laid down in the best authorities, I now declare that after an experience of more than twenty years, I have not the least confidence in its truth.

The doctrine has been taught that the best course to adopt with intermittent fever is, "to let it wear itself out," but frequently the process wears out the patient first. My doctrine is to stop it as soon as possible. By so doing you prevent its terminating in organic disease of the spleen, known as "ague cake;" which would be a sufficient reason for a prompt cure, were no other or greater evil to be apprehended.

I might here remark that you will find in many instances a tendency to a return of the disease at set periods. The laws of periodicity appear to extend beyond the time governing the return of each paroxysm, and to produce a predisposition to a relapse at periods of about seven days. So that a return may be apprehended on the same day of the week on which the last occurred; or to state it categorically, there is a tendency to a return on the seventh, fourteenth, twenty-first, etc., day from the time of the last chill. Physicians familiar with this disease have observed this tendency, and many have adopted the plan of fortifying their patients against the disease at those particular times. Whether the rule is to be relied upon or not, your minds should be directed to the question; as the days mentioned have long been considered important days, and your reputation as well as success in practice, will be promoted by a familiar acquaintance with all these doctrines. You will hear it said frequently that "any one may cure ague," but the physician is expected to keep it off, and if you can by attention to these peculiarities of the disease, steal a march upon, and thus conquer it, as I believe you may in many cases, it is quite a triumph for the profession.

LECTURE IV.

MALARIAL FEVERS—CONTINUED.

Intermittent Fever Continued: Periodicity; Diversity of Opinion; Explanation Suggested.—Complications; Gastro-Intestinal Inflammation; Congestion of Liver, Spleen and Brain.—General Remarks; Differences of Susceptibility; Post-Mortem; Causes, Predisposing and Exciting; Prognosis; Diagnosis; Treatment, Palliative and Radical.

INTERMITTENT FEVER—CONTINUED.

In the last Lecture the subject of *Intermittent Fever* was considered; a general description of the disease in its several stages was given, and many modifications, variations and peculiarities were referred to, or briefly described.

Let us this morning, examine more closely than we have hitherto done, that remarkable and distinguishing feature of this form of disease so often mentioned, its *Periodicity*. The fact has been stated already, and fully sustained, that this fever is marked by regularly alternating paroxysms and intermissions; and perhaps all has been said which can at present have any practical bearing. Still the inquiring student can not but feel a desire to go beyond the mere fact, and study the philosophy of such phenomena, and, if possible, ascertain the laws by which they are governed; and, as a teacher, it would afford me great satisfaction to be able to develop the subject in hand with satisfactory clearness. This, however, I can by no means promise; but must acknowledge with my predecessors and contemporaries, almost total ignorance of the laws that operate in producing the regular periodical return of the paroxysms in this form of disease. Still, it may not be unprofitable to spend a brief space in considering some of the theories which have been advanced, and in presenting such considerations and suggestions as have offered themselves to my mind, upon this interesting subject. For, although I have nothing of a tangible or conclusive character to submit which may satisfy your laudable

curiosity, or even guide you in the treatment of the disease, yet suggestions will be made which may perhaps assist you in future researches and investigations. For this purpose, and with a view of directing your attention to every thing connected with the nature and progress of this important class of diseases, I take up the subject at the present time.

On this topic there is a great diversity of opinion, and several fine spun theories have been adduced by writers. Willis, I believe, started the doctrine that the cause of intermittent disease was a fermentable substance in the blood; that the blood contained certain elements, which, whether carried into the circulation by absorption, or suffering certain changes produced by the nervous influence or some other cause, underwent fermentation and thus produced disease. But I can not perceive how this theory can be reconciled with the periodical character of this disease, and much less how it can explain it. The question instantly arises, if the disease is dependent upon a fermenting element, constantly going the rounds of the circulation, why does it return at regular stated periods? Why should not the effect of the fermentation be continuous? The theory does not explain the facts, and I consider it but a vagary of the imagination.

Bailey sought to explain this periodic tendency, by referring to the change from an erect to a recumbent posture, so regularly occurring every day. But how this can explain the peculiarity in question he has failed to show, and had he attempted it, he would have found himself involved in a difficulty from which he could not have escaped. One single fact is sufficient to prove the futility of his theory, and that is, the frequent occurrence of the double quotidian type of fever while the patient is constantly in a recumbent position, until the disease is arrested.

Cullen's explanation may be considered more reasonable and philosophical perhaps than any of the others. He attributes its periodicity to the diurnal changes from day to night and from night to day. If the paroxysms always returned daily, there would seem to be some propriety in referring them to, or at least associating them with these daily changes. But since we so often have the paroxysm returning twice a day, once in two or once in three days, it fails to afford a satisfactory explanation. Above all, if the diurnal changes have this influence upon the animal economy in intermittent fever, why should other diseases be exempt from it? Why should not typhoid fever, small-pox, etc., be influenced by the same

cause? No answer can be given, except to repeat that the assumption does not explain the phenomena of periodic fever.

We inquire then what explanation consistent with known facts, can be given of this remarkable feature of intermittent disease? And though I may not be able to answer this question with entire confidence, nor perhaps suggest a theory more satisfactory to you than those I have just adverted to; yet I confidently believe the views I shall present, if properly investigated, will tend to more valuable practical results. If they do not constitute a conclusive solution of the mystery, they nevertheless lead toward one, and since the matter is so completely shrouded in obscurity, any thing that will tend to develop it ought to be discussed and investigated in all soberness and candor.

I have no doubt that the true explanation of the phenomenon in question is to be found only in the nature of the specific cause that produces the disease. We find that every principle and element in nature is governed by laws peculiar to itself. Periodical change is a peculiarity of organic life. To perform its natural functions it must have its regular rise, progress and decline. If then we suppose, and I have little doubt of the truth of the supposition, that intermittent fever is produced by animalculæ, we find a cause which must have regular periods of action and of rest. This view it appears to me, if well considered must more nearly approximate to the desired explanation, than any heretofore suggested. And I will remark, that, whether this view, or speculation as it may perhaps be called, has or has not a direct bearing on the question under consideration, it at least suggests a subject of much interest, the thorough investigation of which may throw some light, not only upon the present question, but upon others of much importance in medical science. We have many things yet to learn on this subject, as well as others connected with the science of medicine. I regard this science as yet in its infancy—just emerging from the dark ages, wherein but little was known of the true nature of disease; a position which the results of medical practice hitherto fully sustain.

I come now to speak of the complications with which we frequently meet; a subject which you perceive is of more practical importance in relation to treatment than those which have hitherto occupied our attention. Intermittent fever may be associated with almost every other form of disease to which humanity is subject. This announcement may surprise you, but I have scarcely

met with a disease in my practice whether functional or structural, which has not been occasionally complicated with intermittent fever. I shall have occasion hereafter to speak more fully on this subject, and shall not therefore discuss it at length in this place, but shall only enumerate a few of the complications referred to. The authorities dwell upon this subject at considerable length, but do not present it in exactly the same light that I shall hereafter.

I referred in a previous lecture to one complication frequently met with in practice, and which may mislead you in your diagnosis: I mean gastro-intestinal inflammation, accompanied with great disturbance of the stomach and bowels. Though this condition should as far as possible be palliated; the main object should be to remove the real disease, which is the intermittent fever. This complication will generally be known by the symptoms accompanying a case of cholera morbus, as well as by the peculiar appearance of the tongue, which will exhibit on the edges if not over the whole surface, a very red appearance, generally moist, but invariably red. There will also be much pain and tenderness in the epigastrium.

Congestion is another complication or embarrassing association of intermittent fever. This is indicated by a dry tongue, a peculiar dry and glassy appearance of the tongue and lips, frequently a shining appearance of the face, and by a full bounding pulse; and, upon examination of the spleen and liver, these organs will be found to be engorged or distended. This too may be accompanied by nausea and an irritated state of the bowels; but such is not usually the case. During the paroxysm all these symptoms may be present, and after the decline of the fever they may pass off, leaving the patient in a comfortable and comparatively healthy condition during the apyrexia. But if the attack is of the malignant character, with paroxysms occurring every day, or even every alternate day, your patient will not be able to be up at all. There will not be an entire cessation of the symptoms; the pulse will continue slightly excited, a little wiry and hard under the finger; and the skin, though softer than during the paroxysm, will be more dry and husky than in the interval of an ordinary intermittent fever. As soon as the intermission comes on, you should in such a case administer your remedies to prevent another paroxysm. During this complication there is not unfrequently a very low state of the system, which is very liable to be mistaken for typhoid

fever, and under such circumstances a correct history of the case is of the utmost importance. Without this you will lose many patients whom, with proper investigation you would succeed in saving; for in many of these cases, and especially in the South, the patient sinks under the second or third paroxysm and dies.

In some instances the paroxysms will be accompanied with delirium, and all the symptoms of inflammation of the brain, and here too, you are in danger of committing a gross error without careful diagnosis. For instead of exhibiting the heroic treatment indicated by cerebral inflammation, you should simply palliate until the fever begins to decline; and then treat with a view to the periodic character of the case.

These are the most important complications of this disease likely to be encountered in its treatment. Always bear in mind the periodicity of the disease however slightly developed, and then, whatever its character or whatever its complication, you will usually succeed. Without attention to this characteristic you will be liable to commit very grave mistakes.

Intermittent Fever is a disease from which no age, sex nor condition in life is exempt. Though it has been considered by some authorities as more peculiar to adult age, and to the male sex, I have found no difference in this respect. The fact that adult males are more frequently exposed to the inclemency of the weather, and debilitated by excessive labor and fatigue, is fully sufficient to explain why they are more frequently attacked than others, if such be the fact. But I have seen the infant not a week old and aged men and women tottering on the brink of the grave suffering under this disease. I therefore consider that all ages, sexes and conditions are equally liable to its influence, under similar circumstances. There are I should remark, some peculiar constitutions that are almost or entirely exempt, while others, by a kind of natural idiosyncrasy are decidedly predisposed to this disease; but such is the case likewise with other diseases. This fact was clearly exemplified during the prevalence of cholera in our country. Every person felt to some extent the influence of the epidemic: a degree of lassitude and enervation with the peculiar effects of the epidemic upon the stomach and bowels. Still, there were many whose constitutional vigor was such, that this influence was scarcely recognized, being able constantly to resist its encroachments; while others exposed to the same cause, soon sunk under the disease. I have seen persons who had been for

years exposed to small-pox without being apparently affected by it, although unprotected except by the resisting power bestowed upon them by nature. These, however, are exceptions to the general rule. The general principle to be recognized is, that when a person is fully exposed to the cause of disease, he will take it.

In regard to the effects of intermittent fever on the system, as shown by *post-mortem* examinations, I deem it proper to make a few remarks. A great number of complications, as has been shown, are met with during the progress of this disease, and of course these will modify the post-mortem appearances. These modifications should not, as has been too much the case, be regarded as necessary results of intermittent fever. An individual with a diseased *liver*, on being exposed to malaria, may take intermittent fever and die; and on post-mortem examination extensive disease of the liver is discovered. Now I ask if it should be taken for granted that the condition of the liver was caused by the fever, or even that the disease of the liver caused the febrile disease? Certainly neither; they were merely concurrent diseases, influencing and modifying each other it is true, but having no necessary connection in the relation of cause and effect.

There is, however, one organ upon which the influence of intermittent fever seems to fall with peculiar force; that is, the spleen. This is considered a settled fact. The existence of "ague cake," or enlargement of the spleen, is frequent in all classes of society. You rarely meet with an individual who has had a protracted attack of this disease, who has not more or less enlargement of the spleen; and this pathological result may be put down as a general rule. In some cases the enlargement is slight, while in others it is almost incredibly great. I have seen a case where it occupied the whole superior portion of the abdomen lying crosswise beneath the liver. Then again, I have seen cases where it entirely changed its position. I remember one case in particular, where I found the spleen had slipped over into the right side, the patient himself being aware of the fact and calling my attention to it. I had no difficulty in bringing it back to the proper locality, by placing the patient in a suitable position, applying a bandage around the body, and sustaining the parietes of the abdomen by a large strip of adhesive plaster, until, by proper treatment, the spleen was reduced to its natural size, and permanently retained.

Another most remarkable instance of the effect of this disease on the spleen I will venture to relate. This was the case of a

young lady whom I was called to see. The spleen had become enlarged, dislocated, and had fallen into the left groin, where it inflamed, suppurated, and was entirely discharged. When I opened the tumor, matter precisely the color of the spleen and even some shreds of that organ only partially decomposed, were discharged. This occurred about eight years ago, and but a short time since, I saw the young lady in Columbus, in as perfect and robust health as any one with a spleen. You may doubt the truth of this history, gentlemen, or at least that the spleen was really discharged in this manner, but all the attendant symptoms, together with the peculiar matter discharged, rendered it clear and unquestionable to my mind that such was the fact, and I would stake my reputation upon the position that a post-mortem examination would demonstrate it. And if the young lady should die, and I have the opportunity, I shall prove the truth of what I have related.

Intermittent fever is supposed to have the power of eradicating other diseases: so much so, that persons with disease of the lungs are supposed to be relieved if they can have an attack of intermittent fever. This may occasionally be the case, but the influence is not as general as it has been claimed to be. I have great doubts whether structural disease of the lungs has really ever been relieved by this cause. A change of climate may bring about a cure of pulmonary disease, and if this change of climate chance to produce at the same time an attack of intermittent fever, the cure is attributed to this latter circumstance.

In regard to the *cause* of intermittent fever, so much was said while we were speaking of malaria that little needs to be added in this place. Still, as we are approaching the subject of treatment, and as the cause of all diseases and especially of the one under consideration must have an important bearing on our treatment, I deem it proper briefly to recur to the subject. The causes of disease are divided into *predisposing* and *exciting*: terms which explain themselves. Now, any thing that has a tendency to deplete and debilitate the system will exert a predisposing influence in the production of this disease. In a debilitated condition of the system there is not so much resisting force, calculated to throw off the encroachments of disease, as in a vigorous constitution. Hence, excessive labor, fatigue, long fasting, debility from other diseases, or whatever weakens the nervous system, will exert a strong predisposing influence. In regard to the exciting cause,

you have heard already all that is necessary to say. I believe it to be the presence of a specific poison known under the name of malaria; whether this depends on a peculiar state of the atmosphere, on animalculæ emanating from the decomposition of vegetable matter, or on some other unknown and equally obscure cause, it does not matter. The history, phenomena and attendant circumstances of this form of fever, all go to prove that it is the result of a specific malarial influence.

The *prognosis* of this disease is a subject that requires but few remarks. Generally, it may be considered decidedly favorable. Yet there are frequently symptoms of complication, which must always be taken into account, as they will, to a greater or less extent, affect the prognosis. And bear in mind that your reputation as physicians always rest to a considerable extent upon the opinions you express on this point. If you are called to see a patient with extensive congestion, with its attendant symptoms, you will of course see the necessity of prompt and efficient action, much more than in a case of simple intermittent fever; for in the latter case your prognosis would be favorable, while in the former there is much less certainty. Still, even these malignant cases, which if neglected or improperly treated run speedily to a fatal termination, may generally be controlled and arrested by prompt and appropriate treatment. So that the presence of the malignant symptoms will rather modify your views of the treatment to be employed, than affect your prognosis of the final result. Always remember that the more severe the symptoms, and the more complicated the disease, the greater the necessity for promptitude and efficiency in your efforts to arrest it.

It is scarcely necessary to say any thing here on the subject of *diagnosis*, in view of the full discussion of the symptoms of this disease and its complications to which you listened during the last lecture. In the simple form of the disease there can be no mistake; the patient himself, if intelligent, will generally recognize it. In the obscure, masked, and complicated forms, there is more perplexity, but by recurring to what has been said upon those subjects, you will generally have little difficulty. One distinguishing mark will always characterize the disease, its perfect periodical intermissions.

The *TREATMENT* of intermittent fever may be divided into *palliative* and *radical*. The palliative treatment depends on the stage in which you prescribe; I shall therefore briefly give you that which

is appropriate for each stage. In a former lecture, it was stated that almost every disease, and especially fever, has its forming stage: and in this stage, by a proper course of treatment, with care in regard to diet and exposure, the disease may be warded off without being permitted to develop itself. The business of the physician consists as much in preventing as in curing disease: and you will often be called upon by families that are careful of their health to prescribe in the early symptoms of approaching fever. A mild aperient such as the compound pills of aloes of the American Eelec. Disp., given so as to produce a slight action of the bowels, will generally be sufficient. But if it is complicated with torpidity of the liver, I would recommend small doses of podophyllin and leptandrin,—not, however, with a view to act as a purge, but rather as an alterative. The dose may be, say, podophyllin gr. $\frac{1}{2}$, leptandrin gr. $\frac{1}{2}$, given at bed-time two or three evenings. It is sometimes well to give a general tonic, and for this purpose, boneset (*Eupatorium Perfoliatum*) is as good an agent perhaps as you can administer. This will frequently act as an aperient, though not reliable as such for all constitutions.

In the cold stage as a general rule you should simply make the patient as comfortable as possible for the time being. In cases, however, where there are very violent symptoms, with pain in the back, and the head very hot, more active measures are required. Apply sinapisms to the whole length of the spine and hot bricks to the feet. Bathe the head with warm water, and fan it so as to cool it by evaporation.

The hot stage, also, requires but little treatment. Bathe the entire surface with warm or tepid water, or water and whisky. This shortens the paroxysm and relieves the patient of much suffering. Where there is vomiting and purging as occurs in the complications of the gastro-intestinal irritation with this disease, such treatment should be employed as is indicated by other cases of cholera morbus. As good a remedy as you can use in this case is the compound powder of rhubarb in small doses, say, a teaspoonful every half hour, and at the same time apply sinapisms over the stomach. If this do not relieve give from one-twelfth to one-eighth of a grain of morphine. This treatment you will frequently find to relieve your patient of much pain and suffering.

[Where the *cold stage* is characterized by great prostration, as

evinced by a very feeble pulse and faintness, a stimulant similar to the following will be found beneficial :

℞. Tinc. Xanthoxylum (berries),
Tinc. Serpentaria, *āā* f3ss,
Tinc. Capsicum, gtt v.

Mix, and give every half hour in a little coffee or warm water.
Or,

℞. Oleo-resin of Xanthoxylum,
Capsicum, *āā* gr. j.,
Carbonate of Ammonia, grs. iij.

Mix, and give in a teaspoonful of lemon or simple sirup every hour.

Where the prostration is extreme, chloroform inhaled so as to produce its primary or stimulant effect is useful. Or it may be given internally in a little sweet oil, or combined with oil of turpentine, thus :

℞. Chloroform,
Oil of turpentine, *āā* f3j.,
Oil of Olives, f3ij.

Mix, and give half a teaspoonful every fifteen or twenty minutes, shaking the mixture well before giving it. S.]

LECTURE V.

MALARIAL FEVERS—CONTINUED.

Treatment continued: Palliatives—How Varied; Restlessness—Case Cited; Determination to Head; Doubtful Cases—Case Cited; Radical Treatment—General Directions—Remedies; Former Practice—Evacuants; Dr. Morrow's Practice, Reasons for Differing; Popular Remedies—Case Cited; Treatment for Vomiting and Purging, For Nervous Irritation; Protracted Cases; Additional Means—Tonics—Cinchona—Iron; Remarks on Various Remedies; Dr. Bell opposed to Fowler's Solution of Arsenic; Old School Doctrines; Differences between Authors; Opinions of Dr. Bell and Dr. Wood Compared and Criticized.

INTERMITTENT FEVER—CONTINUED.

At the expiration of my hour yesterday, I was speaking of the palliative treatment as required in the various stages of intermittent fever. There are other suggestions which I desire to make before proceeding to the radical treatment.

The object of the *palliative* treatment is, as the term implies, to modify the present symptoms, ameliorate the sufferings of the patient, and shorten the paroxysm. Now in addition to the treatment given yesterday as appropriate to the hot stage, other measures under different circumstances may be employed with advantage. If you are called to a patient in the hot stage and find him very restless, complaining of much pain in his back and head, and exhibiting evidence of general uneasiness by constantly turning from side to side; you will find nothing so prompt and efficient as an opiate. Our diaphoretic powder in ten grain doses, the sudorific tincture in doses of a drachm, or, if preferred, the eighth of a grain of morphine may be administered. I very well recollect a case where an old-school physician had been in attendance for two or three days. When he found the patient in the condition just described, he proposed to bleed him; but the friends would not submit to it. This offended him and he immediately left the case. I was then called in and found the patient still suffering under the symptoms above mentioned. I prescribed an eighth of a grain of

morphine to be taken at once, and another if the first should not produce the desired effect; had sinapisms applied to the back and extremities, and warm bathing to the head to cool it by evaporation. As I returned, I met the physician who had first seen the case, and mentioned that I had been called to see the patient. "Well," said he, "did you bleed him?" I replied in the negative. "Then he will die," he said, and passed on. I saw the patient again the next evening, and found him in a gentle perspiration and all the symptoms of active febrile excitement gone. I then prescribed the radical treatment which will be presented to you soon, and he had not another paroxysm.

I have seen other cases where the determination to the head was so great as to produce partial coma, with coldness in the extremities, even during the hot stage. In such cases, should the active revulsive measures generally employed for congestion of the brain prove ineffectual, I apply ligatures around the limbs to interrupt the venous circulation, and thus retain the blood in the extremities. But let me caution you in applying the ligatures, to be careful not to have them too tight, so as to compress the arteries as well as the veins, lest, by cutting off the circulation entirely from the extremities, you defeat your object and do serious harm. The pulse will be your criterion in this respect. The application of ligatures is an effectual means of diverting the circulation from the head and trunk to the extremities.

There are cases to which you will be called, of the history of which you can learn but little. One of this description I remember particularly, as occurring in my own practice. I found the patient in a deeply comatose condition, entirely insensible, so much so that I could not arouse him to let me see his tongue. By pressing down his chin, however, I could see that the tongue was moist, but pallid and coated. The pulse was small and thread-like, beating at the rate of 120 to 130 per minute. There was a collapsed appearance of the capillaries, and the whole body was covered with a clammy sweat. I was unable to ascertain whether it was his first or second paroxysm, or whether he had ever been sick before; but I was so well convinced from the season of the year, and the location in a malarious district, of the urgency of the case, that I permitted no time to be lost. Therefore, without waiting for the paroxysm to subside I commenced giving him quinine and whisky, and in twelve hours administered 20 grains of quinine and a pint of whisky. This entirely relieved him and he had no return of the

paroxysm. I found the patient next day perfectly conscious, his pulse had fallen to 80 per minute and not a symptom of disease followed. I mention these cases in this connection, merely to show how varied are the aspects assumed by disease, and how impracticable it is to furnish fixed rules for even the palliative treatment. We can only rely upon our own judgment guided by general principles.

I come now to speak of the *radical* treatment, or that which is relied upon to effect a permanent cure. Ordinarily, it is proper to permit the paroxysm in a measure to subside before using the remedies of which I am about to speak. But in very violent and rapid cases of the quotidian type, where the intermission is short, it is necessary to commence at once. I do not regard the fever in these cases as a contra-indicating condition, but come in at once with antiperiodic treatment. Perhaps the life of the patient may depend upon the arrest of the disease before another paroxysm, and we must take advantage of all the time we have to accomplish this object. Generally, however, we palliate, as heretofore taught, during the febrile stage, and then exhibit our periodic treatment. My custom is to administer sulphate of quinine and prussiate of iron, of each three grains, mixed, once every two hours until the next period; and if there is reason to fear that the time is too short to accomplish the object, I usually administer a dose of compound tincture of serpentaria one hour before the anticipated chill. This was an early practice with me, and in urgent cases I still pursue it, having found it successful in preventing the next paroxysm in almost every case. This tincture may indeed be given twice, and followed by some warm diaphoretic tea, and hot bricks to the feet. These measures tend to produce perspiration and lessen the nervous irritability upon which the recurrence of the paroxysm very much depends. I have seen many cases arrested also by the use of the compound powder of opium and ipecac. an hour before the chill was expected. During my early experience my course was about as follows: First, if time permitted, I gave a cathartic, then quinine and iron, or quinine alone, and followed this by the tincture or powder in the manner just stated. This mode of treatment has proved successful in arresting almost every case, and it is a practice with which I have never had cause to be dissatisfied, although subsequent experience has enabled me to improve upon it in some measure.

There are cases, however, where the patient desires to keep out

of bed and attend to his business during the intermission; and I have found that mild cases may be so treated as to permit this, and with complete success. My present practice in such cases is to give equal parts of quinine and prussiate of iron, once every two hours, in such doses that 24 grains of the mixture may be taken during the intermission. I do not now even administer evacuants in ordinary cases of intermittent fever, for I do not regard them as at all necessary, in view of the true character of the disease. It may be important, under certain circumstances, especially in complications, to employ evacuants, but so far as regards the disease itself which we are now considering, they are not a necessary part of the treatment. If there is an accumulation of vitiated matter in the alimentary canal, and time will permit, I administer a cathartic, or perhaps an emetic, or both; not however as indicated by intermittent fever, but to correct this attendant condition. But in cases where time is important I look upon it as madness to take such a course. Let the antiperiodic remedies be exhibited at once, and contrary to your expectation if your information on the subject has been derived from the ordinary books alone, you will find that the bowels will move sufficiently when the system is relieved of the malarial disease. I have seen this fact illustrated in other kinds of fever as well as in intermittent; and in many cases where cathartics have failed to secure evacuations, I have seen healthy action of the bowels follow the administration of the antiperiodic remedies; not because of any cathartic influence exerted by them, but merely because they destroy the malarial poison which oppresses the nervous system, and thus enable the organs to resume their healthy functions.

I have seen cases of the quartan type where from the attendant symptoms, I deemed it advisable to administer a cathartic with the antiperiodic remedies. For instance, where I find the eyes yellow, and the skin pale or sallow, indicating torpor of the liver, I give the eighth of a grain of podophyllin twice a day and continue it two or three days after the paroxysms are arrested, or till this biliary derangement is relieved.

My much deplored friend, Dr. MORROW, pursued the practice of thorough evacuations previous to the administration of antiperiodic agents. This was to some extent, as before stated, my practice some years ago, but from later experience in regions where intermittent prevails to a great extent, where it is the leading and most common autumnal disease, I have been led (by necessity at

first, and subsequently by the satisfactory results of the course) to adopt a different mode of treatment. His custom was to follow the evacuant by a prescription which has been highly recommended, composed of sulphate of quinine 80 grains, and bitartrate of potassa 1 ounce, dissolved in one pint of brandy. This he gave in tablespoonful doses every two hours during the intermission, until within two hours of the next chill, when he gave two tablespoonfuls. He considered this course safe and efficient; but on the extended alluvial bottoms of the Scioto, and in many other parts of this Western country, where malarial influence prevails to an alarming extent, you will sometimes find it unsafe to adopt a course of treatment requiring so much time, lest your patients slip through your hands before your remedies can arrest the disease. In mild cases almost any ordinary treatment will arrest intermittent fever. Even a powerful mental excitement will sometimes break up the disease. A warm infusion of some mild diaphoretic herb has often been found all-sufficient, and we often hear of some simple remedy of this kind as being "an infallible cure for ague." I well remember an incident in point: A gentleman removed from Licking county to the Scioto bottom, and came in a short time to consult me in relation to one of his children that was laboring under another form of disease. During our conversation he informed me that he had a remedy for chills and fever which never failed to cure. I of course inquired what it was, and he said it was the root of the vervain. I suggested that he would probably soon have an opportunity of testing the unfailing efficacy of his specific; and surely enough, he soon found occasion to give it a fair trial, but it failed to overcome the powerful malarial influence of his new place of abode, and he came to me for medicine for his family.

In those severe cases of vomiting and purging which sometimes occur during both the cold and the hot stage, you will find it important to adopt the most prompt and efficient mode of treatment, as a repetition of the paroxysm may wear out the patient; or otherwise the disease is likely to run into congestive fever. I have never found any difficulty in using the antiperiodic remedies if the stomach will retain them, and if not I administer the quinine by enema, which will answer the purpose. It has been recommended by some to apply a blister over the epigastrium, but I have not found this necessary.

In cases of great nervous irritability, I have found the valerian-

ate of quinine preferable to the sulphate. This should be administered in grain doses once every two hours; and in great irritability, especially of the stomach, the addition of a little morphine has been found very serviceable.

An agent has recently been introduced at the South, as a remedy of remarkable efficiency for intermittent fever; but whether it is really such or not, is not yet satisfactorily determined. I refer to the yellow jasmine (*gelseminum sempervirens*). Its properties are said to have been accidentally discovered by a Mr. Smead, a planter of Mississippi. From what I have heard respecting it, there seems little reason to doubt that it possesses valuable antiperiodic properties; but that it will prove a complete substitute for quinine, as some believe, is, I think, quite improbable. It is said that where it is used, quinine is often combined with it so freely, as to justify the suspicion that the cure might properly be attributed to the quinine instead of the new remedy. [My experience with the *gelsem. semp.* has satisfied me that it possesses very little if any antiperiodic property; but that it is a valuable relaxant in that tension of the system so often present in fever. Where the pulse is very frequent the tincture of *gelseminum* may be advantageously combined with that of *veratrum viride*. S.]

You will often meet with protracted cases of intermittent fever, where, though quinine will arrest the paroxysms, it will not be as efficient in preventing a return, as will some other preparation of the Peruvian bark. I have, in such cases, administered the chinoidine, which acts with equal certainty, in debilitated constitutions, in arresting the paroxysms, and will, with greater certainty prevent a return. This may be given in four grain doses once in two hours. You may occasionally meet with a long protracted case, such as I encountered some time ago, where even the quinine and iron will fail to arrest the paroxysm. In the case I refer to, the individual had been under the influence of intermittent fever for six months, and no means that had been used succeeded in arresting the disease. I found that there was an almost entire torpor of the stomach. He was unable to digest the simplest food; and from being a healthy, vigorous man, was reduced to an emaciated condition. I administered an emetic, and he threw up a large quantity of tough, viscid mucus. The quinine and iron was then given; a free perspiration soon broke out, and the anticipated paroxysm was prevented. I then put him under the influence of an

efficient tonic, by administering the comp. tinc. of tamarac two or three times a day, and the disease has not since returned.

I have been in the habit, where decided tonics were indicated, of employing the precipitated extract of cinchona, which consists of quinine and some of the more tonic properties of the bark combined. It will be remembered that Peruvian bark possesses a number of proximate principles. The chief tonic property of the bark does not reside in the quinine, but is found in another principle called cinchonina. This principle, and the precipitated extract, contain a large proportion of the tonic property; and where you wish to produce a tonic effect, they are preferable to quinine. Iron exerts a beneficial effect when combined with quinine, by its action on the blood, and on the digestive organs. It is especially indicated in those pale, debilitated conditions, arising from the deficiency of the red corpuscles of the blood, of which iron is a constituent.

It is quite "fashionable" in domestic practice to recommend brandy as a remedy in this disease, but it is a dangerous agent; for, unless it arrest the paroxysm (and it is by no means reliable), it greatly aggravates the fever, and subjects the patient to great suffering. As I have already remarked, mild cases may be arrested by very simple means, and sometimes brandy will succeed, but if not, the paroxysm will be much more violent, while nothing will be gained.

I have, in some cases, combined the *piperin* with quinine, in torpor of the stomach, and can recommend it with confidence, not as an antiperiodic, but as a stimulant and tonic.

I was recently told by a friend in whom I have great confidence, of another remedy, which he says he has found prompt and efficient in arresting the paroxysm of this disease; and since it is entirely new and unheard of as a remedy in such cases, I refer to it. It is the *plantago major*, or common plantain. The tincture in brandy or whisky is recommended, to be given in tablespoonful doses once in two hours during the intermission. I will, however, remark here, that although this may be successful in mild cases, I have no confidence in its efficacy in those of a severe character. Still, these simple means are valuable, and should be known to the physician, as they enable him to vary or corroborate his treatment when desirable. Besides, there are many persons who have a strong prejudice against quinine, and if the disease is

not too grave to trust them, it is often well to prescribe some of these less efficient agents.

When there is a complication of congestion or engorgement of the liver, which does not subside with the interruption of the intermittent fever, I treat it as I would the same disease of the liver under other circumstances. I prescribe in such cases small doses of podophyllin and leptandrin. I find the leptandrin to add much to the efficiency of the podophyllin, by acting on the muscular coat of the bowels, and preventing the griping which is sometimes produced by the latter when given alone. Engorgement of the spleen may be treated in the same manner. In short, all complications which may persist after the subsidence of the periodic fever, are to be treated on general principles, just as if occurring as primary affections.

Many other remedies have been recommended in intermittent, and among them Fowler's solution (of arsenic) has been spoken of with the greatest confidence. Respecting this article I will quote an extract from Dr. Bell's Notes on Stoke's Practice of Medicine; although, if I am not much mistaken, Dr. Bell recommended Fowler's solution for intermittent fever in the Commercial Hospital last winter. In the work just referred to (Stoke's and Bell's Practice, 1840, pages 449 and 450), he says :

"A review of the effects of arsenic in intermittent fever, that is, on those laboring under the disease, who have taken it, would, on calm and dispassionate reflection, induce us to wish that its use had never been proposed. The amount of mischief which it has produced must have been excessively great, and exceeding the good that it has been alleged to do, in the same proportion in which cases, where it has been given in ignorance of its operation and the state of the system, have exceeded those where it was administered with all the reservations and restrictions that could be suggested by cautious observation. We are told that it has cured when the bark has failed; but I think it has been sufficiently shown that if the bark fails we have other duties to perform toward our patient than hunting out fresh tonics. When thus unsuccessful, we shall find the stomach irritated, and perhaps inclined to phlogosis, or there is a chronic hepatitis and a tendency to dropsical effusions. Now, most assuredly, arsenic, even if it arrest the chill, is not the appropriate remedy in these circumstances. If we persist in giving it we do so at the peril of our patients, to whom we stand fearfully responsible for the chronic gastritis thus entailed upon them.

"Three of the most obstinate cases of disease which were presented to my notice during last year, were of persons who had used Fowler's solution for the cure of intermittent fever. One was a young man from the country, who had been cured of the chills by this medicine, but who suffered greatly when I saw him from pain and heat of the stomach, which had supervened since he began using the solution. Two bleedings and a reduced diet made him more comfortable; but I was not permitted to see him entirely recovered, in consequence of his return to the country. The second was a young female, who, when I saw her, was greatly distressed by irritability of the stomach, with fixed pain and frequent vomiting; her pulse was hard and active; the appearance of the complexion and other symptoms induced a belief that she labored also under hepatic disease. Upward of two months elapsed before her digestive powers could allow of her using any food at all stimulating. During that period she was frequently bled from the arm and leeches over the epigastrium. The blue pill was administered, and after a while the sulphate of quinine; but both these were soon omitted, as I found the state of her stomach aggravated by their use, and I was content, at last, to rely on depletion, general and local, as above, and occasionally a mild laxative and diluents. Under this treatment she so far recovered as to justify the use, once more, of the quinine; by which, finally, the disease lost its periodical character, and strength and health followed. The third case, also a female, was characterized by nearly the same symptoms, but they were of less duration, and were finally removed by several bleedings, and by the use of the quinine.

"It would be well for us to bear in mind that there are two modes of poisoning. The one sudden and acute, resorted to in moments of temporary insanity or impious despair, for the purposes of self-destruction, or with malice prepense to take away the life of a neighbor; the other is a slower process, practiced by empirics, when they persuade the ignorant and credulous to swallow their nostrums, and, shall we add, by regular physicians, when they direct, without due deliberation, their patients to use arsenic, corrosive sublimate, and some other half dozen of heroical medicines."

There exists a great diversity of opinion among authors in regard to the treatment of intermittent fever, as evidences of which fact, I refer to the writings of Dr. Bell, in the work from

which I have just quoted, and those of Dr. Wood, Professor of Theory and Practice in the University of Pennsylvania,—for between these two authors there is a very marked and palpable difference. From the quotations which will be given, you will discover that Dr. Bell adheres to the old, superannuated doctrine of the necessity of depletion as a leading measure in the treatment of intermittents; that the “tongue must be moist and but little loaded,” before we can, with “prospect of entire success, give the bark or its salts.” On the other hand, Dr. Wood, although still, in my view, a step behind the truth, is evidently on the verge of the very doctrine which I have been teaching. True, he says “first the bowels should be thoroughly evacuated, and then sulphate of quinine should be given freely;” but further on we find the remark, that “whenever the intermission is complete,” “quinia may be given without hesitation;” and he even says, in speaking of inflammation attended with typhoid symptoms, as “when typhoid pneumonia supervenes upon, or becomes complicated with intermittent fever, it will be proper not to wait for a distinct intermission; but administer the quinia as soon as the nature of the disease is ascertained. I have seen the happiest effects result from this treatment; and have been informed by physicians residing in miasmatic regions, that they habitually employ it with great advantage. Not only is the intermittent interrupted, but *the inflammation itself puts on a more favorable character* under its influence.” Now, had Dr. Wood taken the hint from the plain fact just quoted, and made the unhesitating administration of antiperiodic remedies the general rule, wherever the “nature of the disease is ascertained,” and considered the cases where thorough evacuation is necessary exceptions to the rule, he and I would not widely differ on this subject. But I will give you the quotations at large, that you may see whether or not I misrepresent the distinguished authors to whom I have referred. I now read from Stokes and Bell’s Practice, second American edition, pages 444 and 445.

“The call for moderating excessive excitement is not less imperative here” (in treatment of intermittent fever), “than in other maladies, distinguished by similar symptoms, however variously named. We are well aware of the general principle on these occasions, that the risk of subsequent languor and engorgement is greater, if the excitement be allowed to wear itself out by our abstaining from those means calculated to moderate it.

“In the case before us, we have, superadded to gastric irritation

of the stomach, a morbidly exalted action of the other great viscera. Of course, in addition to the indications furnished by the former, we have those supplied by the latter, to direct us to the use of the lancet and the application of cold. In fact, the treatment here is identical with that in every febrile paroxysm of any intensity, whether it be of regular or spurious and malignant, intermittent or remittent, yellow or bilious. It is true that a temporary crisis will generally take place in regular intermittents, without any interference on the part of a physician; but every paroxysm, especially if neglected or mismanaged, predisposes the subject of it to complications and aggravations, at each successive return; and the stomach, liver, and head, from being periodically affected, are after a while permanent sufferers.

"Blood-letting in the hot stage of intermittent fever, thus pointed out by inductive reasoning, has been proved by experience to be on many occasions decidedly beneficial. It is now many years since, while yet a student in Virginia, it became my duty to see and occasionally prescribe for a young man of a thin, spare habit of body, who had been much reduced by repeated attacks of intermittent fever. Bark and arsenic had been administered in vain. Influenced by the recommendation of Senac, whose work on intermitting and remitting fevers I had just perused, I opened a vein in the arm of my patient during the next hot fit, and took away a pint of blood. The relief was immediate; the force of the paroxysm soon subsided; the apyrexia was complete; and a few doses of bark were sufficient to prevent the next fit. He speedily recovered his health and strength, and remained clear of intermittent fever. From that time to the present, I have not hesitated to use the lancet in every case of periodical fever, in which either the apyrexia was not so complete as to leave the patient entirely clear of all gastric and cerebral distress, or in which the paroxysms had been of frequent recurrence, and untractable under the use of the bark. I have usually preferred, when the choice was in my power, bleeding during the hot stage to doing it in the apyrexia; but the experience of every additional season convinces me that in this latter state, also, the employment of the lancet will realize all our best hopes."

Passing over his remarks on cold bathing, I quote a paragraph on page 446:

"Having by these means brought our patient through the cold and hot stages, the sweating will seldom be excessive or enfeebling,

and the succeeding period will more probably be, not in name, but in fact, that of *apyrexia*. Should it prove such, that is, should the tongue be moist and but little loaded, and the skin soft, we can then, with every prospect of success, give the bark or its salts in full doses at short intervals, until in the revolution of time the epoch arrives at which the next paroxysm would probably come on."

As an illustration of Dr. Bell's views and treatment, I will further quote from the same work, commencing on page 450 :

"My experience of blood-letting in the cold stage of fever is recorded in the following terms :


"In two cases in which I adopted this practice the result was not of such a favorable nature. One was evidently benefited; but neither in this nor the other was I dispensed from the necessity of subsequent bleeding before the disease was arrested.

"To these I ought to add a third, which, from its rare occurrence, and the formidable nature of the symptoms, merits a more particular notice. It was of a young mulatto man, who had been confined to his bed for three weeks by gastric remittent fever. The paroxysms came on at irregular intervals, and were always marked by a frequent and rather full pulse, acrid heat of the skin, especially over the abdomen, and a burning thirst. Frequent bleedings from the arm and cupping over the abdomen had been practiced; purgatives of a saline and mercurial character were occasionally administered, which gave some relief at the moment, but always left the stomach and abdomen more tender to pressure, and the skin hotter to the touch. During nearly the whole time the tongue was loaded in the middle with a whitish-yellow coat, while its borders and tip were red and shining. After the expiration of the above time convalescence seemed about to be established; the pulse was nearer a natural standard, thirst less urgent, the temperature of the skin, except over the epigastrium, of an ordinary nature. Pressure on the abdomen rendered the pulsations of the aorta very perceptible. The patient gained very little strength, although he was allowed light animal broth and farinaceous food. Visited in the afternoon of September 17th, of last year (1828). I found him in great apathy, with an inclination to doze. The pulse was not materially altered, nor was there any new symptom. A blister was directed to the back of the neck, and a laxative of rhubarb and magnesia at bed-time. At 11 o'clock, P. M., I was sent for in great haste, and on my arrival found the patient in a

state of complete coma, utterly insensible to all objects of sight, sound, and touch; his limbs, at first extended, remained in whatever position they were placed; the pulse was barely perceptible, and the breathing very slow. It was impossible to make him swallow any thing, or to elicit from him the slightest evidence of consciousness. On applying my hand to the epigastrium, I could feel the abdominal aorta beat with considerable force; so also did the carotids. The contractions of the heart were frequent and laborious. The blister had been put on, but no medicine taken. Sixty leeches were now applied over the epigastrium and sinapisms to the extremities. After the leeches had begun to fill, the pulse lost somewhat of its extreme tenuity, and by the time they were detached, it had regained its natural volume, was soft and easily compressible. The patient at this time began to move his eyes and the muscles of his mouth and face; he turned a little toward one side, yawned and stretched himself. The extremities were still cold and unaffected by the sinapisms. Before all the leeches were removed, the skin became moist in places; and finally a sweat covered the face, trunk, and limbs, with the exception of the hands and feet. Enemata of tepid water were administered at different times through the night. In the morning, though languid, he was partially sitting up in bed, by leaning on his elbow helping himself to some light nutriment. In the afternoon of this day he experienced some rigors, which disappeared in the evening in moisture on the skin.

“On the evening of the following day, 19th, by eight o’clock, he was in nearly the same state as on the 17th, being completely comatose. Cups, in large numbers were applied to the temples, and over the abdomen, so as to detract about ten ounces of blood. The effect was most salutary, and the recovery even more prompt than from the first attack. Enemata of cold water were given on the present occasion.

“An examination of the symptoms of the case on the morning of the 20th, as presented by the pulse and skin, seemed to justify the use of the quinine, from which the furred and chapped tongue on the preceding days had deterred me. A minute inspection of this organ now showed me that under this dry and cracked coat it was pale, and rather thicker than natural. This appearance was readily recognizable by looking at the tip and sides of the tongue. A solution of the sulphate of quinine in water, ten grains to the ounce of fluid, was directed. Of this a teaspoonful was taken



every hour until the afternoon. There was then a very slight exacerbation. The medicine was resumed on the following day, and continued for several days. The patient was thenceforward clear of paroxysmal attacks, and gradually and regularly regained his strength and health.

"Here was an extreme case, in which the coma, evidently a substitute for the cold stage of intermittent fever, was relieved on both occasions by a free abstraction of blood. The subsequent reaction and distress were very inconsiderable, and did not, on either occasion, prevent the patient from sleeping quietly during the remainder of the night."

I can not dismiss Dr. Bell's views, without subjoining a few remarks on the case just presented. It is, to my mind, perfectly clear, that the comatose condition was, as Dr. Bell says, "a substitute for the cold stage;" and I am also confident that this condition would have passed off as certainly and as naturally as does the cold stage generally in this disease; the treatment instituted, and to which Dr. B. ascribes the recovery from these attacks of coma, may, as a revulsive or counter-irritating influence, have done something to hasten the reaction, though I am sure that the loss of blood, so far as it affected the general circulation, was any thing but "salutary." Fortunately his laxative was not given; and the prescription does not appear to have been repeated in the next paroxysm.

Now the great error in this case was in relying upon treatment which, at best, could only palliate, and which, if persisted in, would have permitted the patient to sink beyond recovery, while the physician regarded the "furred and chapped tongue" as contraindicating the only remedy that could reach the case. In justice to the doctor I will add, that he afterward evidently became dissatisfied with his treatment. For having seen a case of epilepsy where, from a misunderstanding of his directions, "twenty grains of this salt of quinine were given in the early part of a day, without any perceptible increase of excitement, heat, thirst, or accelerated pulse," he seems to have thought a different course worth an experiment, at least. He says: "Were I to meet with a similar case of congestive or malignant intermittent, I should give *five grains of the sulphate of quinine at once, and repeat the dose in two hours.*" This circumstance does not, however, seem to have suggested to him any modification of his treatment of intermittents generally.

I will now present the views of Dr. Wood. *Speaking of treatment*

during the intermission, he says (see Wood's Practice of Medicine, second edition, vol. I., page 245, etc.): "The course to be pursued is happily as simple as it is effectual. First, the bowels should be thoroughly evacuated, and then sulphate of quinine should be given freely. Formerly, it was customary to administer an emetic; but this practice is unnecessary, disagreeable, and sometimes mischievous, and has gone out of use. The only condition in which vomiting is clearly indicated, is where the stomach is loaded with undigested food, or oppressed and irritated by acrid accumulations. For the cathartic effect, calomel, as a general rule, is preferable to all others of the class. It not only evacuates the bowels, but unloads the congested liver. It should generally be combined, for adults, with some other purgative, to insure its action. Three or four of the compound cathartic pills may be employed, or from five to fifteen grains of calomel, with a proportionate quantity of rhubarb, jalap, scammony, or compound extract of colocynth; or the dose of calomel may be given alone, and followed in six hours by a dose of sulphate of magnesia or castor oil. When the apyrexia is very short, so as not to allow time for the action of a purgative, and the subsequent administration of quinia, the calomel may be given during the paroxysm. In mild cases of ague, with no signs of biliary disorder or hepatic congestion, it will be sufficient to evacuate the bowels thoroughly by sulphate of magnesia or other saline cathartics, or by the infusion of senna with epsom salts.

"As soon as possible after the bowels have been evacuated, it will be proper to commence with Peruvian bark, or one of its preparations. Of these, beyond comparison the most valuable is sulphate of quinia."

We pass over his remarks on the various salts and preparations of bark, and on their mode of action, and give another quotation, commencing on page 246:

"There has been, and continues to be, a difference of opinion upon the point whether quinia should be given in complicated intermittents during the continuance of any inflammation which may be associated with it. On the one side, it is maintained that the quinia must, by its stimulating properties, aggravate the inflammation; while, in consequence of the constant irritation which this sustains in the system, it will fail to subdue the paroxysmal disease. On the other side, it is answered, that quinia is capable, as proved by the result of innumerable trials, of arresting the intermittent paroxysms under the circumstances mentioned;

that the stimulus of the paroxysmal pyrexia is infinitely greater, and infinitely more likely to support and aggravate the inflammation than that of quinia; and that, consequently, the sooner this medicine is administered the better. According to the former opinion, the inflammation should be first subdued by the lancet, cupping, etc., after which, recourse may be had to the antiperiodic remedy; according to the latter, the paroxysmal disease should be immediately arrested, and then, if the inflammation shall not cease at the same time, it can be treated in the ordinary manner.

"There is a simple rule which, I think, will serve the practitioner as a sufficient guide in relation to this disputed point. Whenever the intermission is complete; in other words, when it is quite exempt from fever, quinia may be given without hesitation, if the stomach will support it. If any existing inflammation is of so low a grade as not to induce symptomatic fever, it will scarcely oppose an obstacle to the antiperiodic action of quinia, and it will be much more likely to yield after the paroxysms have ceased. Indeed, such inflammation is probably often supported by, if it do not originate in, the fever of the paroxysm. When the inflammation is so extensive or severe as to induce fever, though the disease may have the paroxysmal form, yet it will present rather the aspect of a remittent than an intermittent, as there will be fever steadily throughout the interval. In such cases, the use of quinia should be preceded by depletion, and other measures calculated to reduce the inflammation; but as soon as a distinct intermission has been obtained, there should be no longer any delay in resorting to the antiperiodic remedy. When the inflammation is attended with typhoid symptoms, as not unfrequently happens in the Southern and Western portions of this country, especially in the winter, when typhoid pneumonia supervenes upon or becomes complicated with intermittent fever, it will be proper not to wait for a distinct intermission, but to administer the quinia as soon as the nature of the disease is clearly ascertained."

Precisely what Dr. Wood says about emetics as a customary mode of treatment, may be applied, and with equal force, to the cathartic treatment, as indiscriminately employed in intermittent fever—it "is unnecessary, disagreeable, and sometimes mischievous." "The only condition in which a cathartic is clearly indicated," is when the alimentary canal "is loaded with undigested food, or oppressed and irritated by acrid accumulations;" and even this condition should not be regarded as an obstacle to the

exhibition of the antiperiodic where time is at all important; for, as has been before remarked, the paroxysms may be arrested in nearly every case without any preparatory medication; and then, if the bowels do not spontaneously assume their functions, the appropriate treatment may be employed to correct whatever derangement may remain. It is true that emetics are generally more offensive to the patient, and their administration attended with more difficulty; and, consequently, cathartics are generally employed in preference. Still, were I impressed with the importance, in a particular case, of removing acrid accumulations from the stomach before treating the intermittent, I should certainly prefer an emetic to a cathartic. The emetic is more prompt in its action, is less likely to produce irritation or debility; and by the peculiar mode of its operation, tends more to arouse the organs and equalize the circulation than purgatives do. But the cases in which either should be employed are very few, and form even rare exceptions to the general rule. Indeed, my experience and observation go to prove that purgatives generally exert an injurious influence in this disease, by wasting time, weakening the patient, irritating the bowels, and tending to transform the intermittent into the remittent form of fever, and thence it too often passes into a low grade of typhus. I have seen many cases take the course just indicated, terminating fatally, or at best barely recovering from the very jaws of death, which would have been promptly relieved at first by the unhesitating and liberal use of the proper antiperiodic remedy, without evacuation or depletion by any mode.

The doctrine that complications require preliminary treatment before the antiperiodic remedy can be safely employed, has, I think, been already refuted. And I now reiterate—Dr. Bell, Dr. Wood, and other writers to the contrary notwithstanding—that I have given it in hundreds of cases where inflammation, congestion, and other complications were evidently present, and have never seen the least unpleasant results follow; but have uniformly found the symptoms of inflammation or other disorders very essentially modified by the interruption of the paroxysmal disease. And, since so prominent an author as Dr. Wood has ventured to recommend the true course in one complication, that of typhoid pneumonia, I can not but hope the profession is about to open its eyes and see this disease and its treatment in a true light.

LECTURE VI.

MALARIAL FEVERS—CONTINUED.

Treatment of Intermittent Fever, continued: Neuralgic cases; Sun-Pain; Local Inflammations; Remarks on Treatment, Doctrine of Books set aside; Periodic Symptoms in other Diseases; Scarlatina, Croup, etc. Prophylactic Treatment—Recipes; Cholagogue Pill—Recipe; General Directions; Concluding Remarks. Remittent Fever: Synonyms, Localities, Seasons, Periodicity; Differs from Intermittent; Differences of Susceptibility; Forming Stage, Chill, Fever, Remission. Modifications; Complications; Congestion of Liver; Biliary Derangement; Gastric Disorders; Variations of Pulse.

INTERMITTENT FEVER—CONTINUED.

In discussing the character and pathology of intermittent fever, we described several modifications frequently met with in practice. These modifications become especially interesting from the peculiarity of treatment some of them are found to require. I refer more particularly now, to those varieties of "masked ague," or neuralgia, commonly called "sun-pains."

These neuralgic forms of intermittent disease do not yield as readily to the same treatment as does ordinary intermittent fever. They require more antiperiodic medicine to arrest them, and it is often necessary to combine with it some opiate, for the purpose of securing more prompt and perfect relief from the intolerable pain and distress, than can be expected from the quinine and iron alone. I have therefore adopted the practice of administering quinine and iron in somewhat larger doses for intermittent neuralgia than for intermittent fever, and with the last dose, or about two hours before the time for the apprehended paroxysm, give morphine, or comp. tinc. of serp., so as to get the patient under the opiate influence before the time when the pain might have been expected to commence. This is the treatment upon which I have relied, and with uniform success.

The other varieties of masked ague are generally amenable to

the usual antiperiodic treatment. Many cases are encountered in practice presenting all the characteristics of local inflammation, which will yield with remarkable promptness to the remedies proper for intermittent fever. And as stated in a former lecture, I have seen cases cured in this way after they had resisted all the depletory and antiphlogistic remedies of old-school practice. Indeed the effect of this antiperiodic treatment is so very striking as to astonish you if you are not familiar with it. You are for instance requested to prescribe for a case of acute ophthalmia: the conjunctiva, the eye-ball itself, or the lids, and possibly all parts of the eye, are involved in the inflammation, but, upon close inquiry you detect the character of periodicity in the case: you now administer the ordinary remedies precisely as if you had a case of intermittent fever,—and you will see the inflammation disappear as dew beneath the rays of the sun. Thus you afford prompt relief to your patient, and save him it may be from the loss of his eye; for as before related, I have seen at least one person who had been deprived of an eye by this disease, which the course I have described would certainly have saved. I speak of this method of treating this form of disease with great confidence, and have so frequently and thoroughly tested it in practice, as to leave not even the shadow of a doubt of the correctness of my views; and I desire to give it such an emphasis that your minds shall be impressed with its importance, and that you may commence your course of practice with the advantage of that experience which I have had in treating these affections. And permit me once more to remind you of the utmost importance of a correct diagnosis. Without this, you are groping in the dark, and practicing by guess, at the risk of your patients' lives and your own reputation. But, determine first the real character of the disease, and then your course will generally be plain and your treatment successful.

You find the doctrine laid down in your books, that where there is evidence of inflammation it must be subdued, at least to such an extent as to secure a perfect intermission of the febrile excitement, before the bark or its preparations can with safety be administered. This doctrine, I have endeavored to convince you, is not true; and there is perhaps no instance where its falsity is rendered more evident than in the treatment I have employed in erysipelas, attended with periodic fever. This complication I have frequently seen, and have uniformly employed the usual antiperiodic

remedies for the purpose of arresting the paroxysms of fever; and so far from the inflammation or any other symptoms of the case being aggravated, I have always found them all favorably modified under the treatment. The quinine and iron are not of course remedies for erysipelas proper, but by arresting the complication, they relieve the system of an oppressive influence which weighs it down and destroys its powers of resistance, and which by its periodic febrile exacerbations, fans up and aggravates the inflammatory disease. (I prefer the tincture of muriate of iron combined with quinia in erysipelas attended with periodic fever. S.)

You will frequently find other diseases clearly marked with the symptoms of periodic exacerbations, evidently owing to the malarial influence. These cases also indicate the antiperiodic remedies to remove the paroxysmal tendency. I have seen even scarlet fever essentially characterized by regular periods. "Is it possible," you are ready to ask, "that you will treat scarlatina with antiperiodic measures?" No, gentlemen, I will not treat scarlatina thus, but I should most assuredly treat this modification of it, or rather complication with it, with the very remedies I should deem applicable to the case were there no scarlet fever present. Having overcome the periodic tendency, we then have a simple case of scarlatina to treat, without the aggravating influence of paroxysmal fever.

I have also seen this peculiar symptom of periodicity associated with croup, with inflammation of the lungs, and with various other forms of disease, and I always regard them as calling for the interposition of antiperiodic agents; but as I shall speak of this matter in connection with the individual diseases, I shall not dwell upon them now. I merely admonish you always to be on the alert for this malarial influence, so prevalent in this Western country, and which is so prone to develop itself in connection with every form of disease. You surely can not be too much alive to the importance of always detecting an influence so all-pervading, and at the same time so potent in producing disease. No other cause of disease is so generally diffused, and consequently the peculiar diseases produced by it, either occurring alone or associated with others, are constantly encountered by the medical practitioner; and it should be matter of gratitude with the profession and with the world, that Providence has furnished us with means so efficient, with which to meet a morbid influence so wide-spread and so powerful.

We come now to speak of the treatment to be pursued to pre-

vent a return of the paroxysms after they have been arrested. And here your reputation is very much involved, for unless you can prevent a relapse, you will be told frequently, that you can do no more than the patient can do for himself. The question propounded to the physician is not so often in reference to "breaking the chill," as whether he can prevent a return. And fortunately, gentlemen, you need have no hesitation in promising a permanent cure, with proper care and attention on the part of the patient. If the case is a protracted one, having been interrupted frequently with a constant tendency to relapse,—as is very often the case,—you should inquire carefully into its history, and you will generally find that the relapse has occurred in one, two, or three weeks from the time of interruption. Thus you will detect a tendency to a return of the disease in periods of seven days; and this is sometimes as regular and well-defined as the diurnal paroxysms. It has been said that the quotidian type tends to recur every seventh day, the tertian every fourteenth, and the quartan every twenty-first day. Whether this be so or not, is not essential. The question will be, what has been the tendency of the case in hand? The answer to this question may sustain or refute the assumption that each has a period peculiar to itself; for I have seen the quotidian return once in two weeks, and the tertian once in seven days; but you may ascertain the periodic tendency of the case before you, and having learned this much, your course is plain. Stop the paroxysms as promptly as possible and prescribe a prophylactic against the anticipated relapse. Let your patient commence at once the use of some general tonic and alterative medicine; for you will find these cases attended by great debility, and general functional derangement, requiring more or less attention. To fulfill these indications, the compound tincture of tamarac, with the addition of a small portion of podophyllum to keep up the action of the liver, is the best article of which I have any knowledge. The tincture is composed as follows:

- R. Tamarac bark (*Larix americana*), 3vj.
- Prickly ash bark (*Xanthoxylum fraxineum*), 3iv.
- Wild cherry bark (*Prunus virginiana*), 3ij.
- Seneca snake root (*Polygala senega*), 3ij.
- Tansy leaves (*Tanacetum vulgare*), 3j.
- Devil's bit root (*Liatris spicata*), 3j.
- Gum aloes (*Aloe spicata*), 3ss.

Pulverize coarsely and mix. Make an infusion of one ounce of the above in a pint of water; to this add a gill of molasses and one

pint of best Holland gin. Dose, half a wineglassful two or three times daily.

This tincture, with the addition of podophyllum, as above stated, combines many properties adapted to fulfill the indications in such cases as we are considering. It is tonic, diaphoretic, aperient, decidedly cholagogue, and withal a good diuretic. Being thus calculated to act upon all the great emunctories of the system, and to give tone and vigor to the digestive organs, it is adapted in an eminent degree to correct those derangements and the debility so characteristic of these chronic cases of intermittent fever.

Another recipe which I have found very efficient in restoring tone and healthy action, and which may be used instead of the foregoing, is the following:

R. Peruvian bark, ʒij.
Rhubarb root, ʒj.
Gentian root,
Orange peel, āā. ʒss.

Pulverize, mix, and add a quart of Lisbon wine. Dose, a wineglassful morning and evening, slightly increased about the time when a relapse is apprehended.

(The ammonio-citrate of iron, ʒj., is a valuable addition to the above recipe, especially where there is pallor of the skin and debility, indicative of anæmia. S.)

There are, however, peculiar circumstances under which neither of the compounds just mentioned will be proper; as for instance, when the tongue is red and the pulse frequent and excited, with pain on pressure in the epigastrium, evincing gastro-intestinal irritation. In such cases, if the liver is torpid, give the following pill every evening:

R. Podophyllin, gr. $\frac{1}{8}$.
Leptandrin, gr. $\frac{1}{4}$.
Ext. Taraxacum, q. s.

In connection with this pill you should give an infusion of *Eupatorium perfoliatum* and *Ptelea trifoliata*, in such doses as may agree with the stomach.

The above measures should be continued up to and beyond the time for the next anticipated return of the disease; and about the time when the relapse is expected, a few doses of the antiperiodic remedies should be administered. By this course, you will seldom if ever fail of effecting a permanent cure of the intermittent disease, at the same time that you build up the strength of your pa-

tient and restore him to health. I have never had any difficulty where I could obtain a correct history of the case, and could then completely control the patient.

If you find that the pill above directed does not overcome the torpor of the liver, make your doses more efficient by increasing their size. I generally administer this medicine to the extent of producing a decided cathartic effect; and it seldom fails of success even in the most obstinate cases of hepatic torpor.

A regular and judicious course of diet is of the utmost importance. The patient should abstain from highly-seasoned and indigestible food. What he eats should be of a wholesome and nourishing character, and the quantity should be determined by the state of the digestive powers. He should eat as much as will be easily digested. I do not hold to the Grahamite system of starving patients on brown bread; I have never found such a course necessary, and do not believe it would be proper. My rule is, generally, to restrict the patient to good, wholesome, nutritious diet, and within that limit leave him to follow the demands of his stomach, both as to the quantity of his food and the articles of which it shall consist. For as a general rule, the appetite will require what is best for the nourishment of the body. True, the appetite sometimes becomes morbid, but this is an exception to the rule. Persons under the influence of a vitiated taste or at the suggestion of friends, may express a desire and even a fondness for very objectionable articles of food. But in these cases, imagination or memory or some extraneous influence suggests the desire, and not the natural promptings of the appetite. The stomach is seldom known to demand hot bread, hot tea and coffee, or greasy and highly seasoned food; and such articles I proscribe in these cases. I have usually found pork objectionable also; and indeed I seldom recommend it under any circumstances. But fowl, mutton, and wild game of all kinds are easily digested, and very suitable articles of diet in cases of debility.

In those cases where there is much irritation of the alimentary canal, the diet should be principally of the farinaceous kind, and it is important also to apply a sinapism or other counter-irritant measure over the stomach and bowels from time to time, until the irritation is overcome.

I have now, gentlemen, given you my views of this disease and its treatment as I have formed them from reading, observation and experience. Starting from the point at which I dismiss the sub-

ject, you will I trust not only test the doctrines I have advocated, but in the true spirit of progress press onward in the way of research and investigation. For although I have endeavored to reflect upon your minds what from long experience I am convinced is truth, and nothing but truth, yet I should have but little hope, either for your success as practitioners or for the advancement of medical science in your hands, did I believe you would settle down in a routine course of practice, satisfied with the experience and investigations of your predecessors. Let me impress it upon your memory, that what has been learned and is now taught, is but the initial step to still further investigations and greater developments of truth. If I can give you an impulse in the direction of scientific progress; if I can in this department prepare you to leave college with a strong desire for truth, and a determination to prosecute your researches with energy and perseverance, I shall have accomplished my object. Go on then and store your minds by the constant acquisition of knowledge; make new and important discoveries in the healing art, and let the world hear from you. It will be highly gratifying to me to hear in the future from any of those who now sit under my instructions, the announcement of the discovery of new and important truths in the science of medicine. And let me now assure you, gentlemen, that whatever your experience may suggest in this important department of human knowledge, shall never be repulsed by me in the dogmatic spirit of one who is wedded to old theories and long cherished prejudices. We may and perhaps are apt to fancy that we have the true system of treating disease; that all has been learned that it is the privilege of man to know on particular subjects; we may indeed be abundantly successful, and entirely satisfied with our mode of treatment; still we may be mistaken. There may be other means beyond the range of our present knowledge yet to be discovered, which shall prove more prompt, efficient, and certain than any thing now employed. And I hope it will not be long before some one may be able to announce new means for the treatment of malarial disease; so that we may no longer be confined to a few antiperiodic agents in meeting this formidable, widespread, and ever-varying class of disorders. We are not thus confined in the treatment of other maladies, and why should our resources be so limited in this most prevalent form of disease? I therefore urge you to persevere in your researches with untiring industry; to look deeply into this obscure and intricate science

and contribute all in your power to the development of new practical truths.

II. REMITTENT FEVER.

We will now take up a form of disease which has received more names than any other in the nosological catalogue. It is known by a different name in almost every distinct section of the world where it prevails; and scarcely any other disease is so nearly universal in its prevalence. I refer to remittent fever. It is often named in accordance with the location where it is remarkably prevalent. Thus it is called Bengal fever, owing to its prevalence in the vicinity of the extensive swamps on the borders of the Bay of Bengal. It is known in the malarious districts of Africa as African fever. In our country it is sometimes called Michigan fever, because of its prevalence in that State, among the swamps and low alluvial lands. It has also been called bilious fever, and by this name it is more generally known than by any other. This last name has been applied to the disease, because it was supposed to be caused by a derangement of the biliary functions,—a most egregious error by the way, and one upon which has been based an enormous mistake in treatment. Not only did the name originate in a false view of the cause of the disease, but the false name has done much to perpetuate the error in regard to its character and treatment—an error which has carried more victims to the grave than the disease itself. Students and practitioners finding in their books the term bilious fever connected with certain characteristic symptoms, very naturally understood it to imply either structural or functional disease of the liver, and consequently directed all the force of their treatment to that organ; and therefore, I have no doubt that the treatment has been more destructive to life than the disease itself would have been, had it been left to contend with the unassisted recuperative efforts of the human constitution. While conversing sometime since with a very scientific and intelligent gentleman on this subject, he remarked, that he had no doubt that most of the early settlers of the Scioto Valley, who had left this stage of action, the supposed victims of bilious fever, were in reality carried off by the treatment resulting from this misnomer. This false name has therefore been productive of much mischief.

It might perhaps with some propriety as suggested by Dr. Wood, be called miasmatic fever; for such it is in fact. It might

also, with equal propriety be denominated periodical fever. But both of these terms are as truly descriptive of intermittent as of remittent fever, both being miasmatic diseases, and both periodical also. A better name than any other, because it expresses in some measure both the cause and character of the disease, is, miasmatic remittent fever.

This form of fever occurs in nearly all parts of the United States, but it is especially endemic in that region of country extending from the Northern Lakes to the Gulf of Mexico. It is not however, equally prevalent throughout that extent of country; there being some localities where it seldom occurs, while in others it constitutes the principal disease. It is much more prevalent on the Scioto, Miami and other rivers than on the shore of Lake Erie. And in the Southern States, where the extensive tracts of alluvial soil produce a vast amount of vegetation, and where the intense heat causes a rapid and thorough decay, this disease not only prevails more generally, but is far more malignant and fatal than in the Northern States. It is occasionally found on the extensive bottoms of the Connecticut river; but with this exception rarely occurs in the New England States—the hilly and mountainous districts being entirely exempt from it.

This disease is also more prevalent in particular seasons of the year than in others. During the autumnal months when the profuse vegetation of summer is in the process of decay, remittent fever is more likely to prevail than at any other time; and it generally continues until the frost arrests vegetable decay, and perhaps decomposes the poisonous or morbid influence. It is not, however, entirely absent during the winter, especially when the weather is warm and open, as is frequently the case in our country; and it often reappears in the spring. So that although autumn is the time when this disease most generally makes its appearance, you may expect to encounter it occasionally during other seasons.

Remittent fever, as has been already stated, is periodic in its character; but it is not like intermittent fever, marked by a complete apyrexia. The fever in this disease exhibits regular exacerbations and remissions, sometimes quite distinctly defined, in other cases very obscure, and with difficulty recognized by an inexperienced person. The latter is likely to be the case, especially where the disease is accompanied by a paramount local derangement, the

about his business unconscious of his condition, merely feeling "a little unwell." Perhaps the appetite is somewhat diminished, a disagreeable taste is in the mouth in the morning, a general uneasiness is felt, with a disinclination to bodily exercise or mental effort; still, he may not realize the true state of his case, nor the importance of prompt measures to ward off the threatened disease. Those however, who have had this fever, will be able to anticipate its approach and may generally avert it by proper attention to diet, by avoiding exposure and fatigue, and by the use of some mild diaphoretic and tonic tea, as mentioned while speaking of intermittent fever. Hence, it is of vital importance that all persons should understand these premonitory symptoms.

A *chill* finally occurs—the individual feeling creeping sensations of cold at first, and at last a fully developed chill; sometimes even a shake comes on; but as a general rule the chill is slight compared with that of intermittent fever. The *febrile* reaction soon follows, with symptoms essentially the same as those found in the hot stage of the intermittent. There is a general derangement of the functions of the body: the secretions being disturbed and the sensibility perverted. The pain in the back increases as the febrile reaction becomes established; the urine from being copious and colorless becomes scanty and high colored. This is a symptom peculiar to this stage. Pain in the head is a very common and often a very troublesome symptom during the hot stage. The skin becomes hot, dry and husky, and upon careful examination with a thermometer the heat of the body will be found positively increased; the mouth becomes dry and the tongue covered with a white fur; or if the biliary function be much disturbed, the coat on the tongue will be dark brown; sometimes however it is not coated at all; the eyes are suffused, and the face flushed; the pulse full and frequent, though in this respect there is much variation in different cases. It is generally accelerated, but there are instances in which the pulse is actually slower than usual—showing a low condition of the nervous and vital energies. If there is much gastro-intestinal irritation, there will be diarrhea.

This stage lasts usually about twenty-four hours, when a gradual yielding of these symptoms occurs. The pulse becomes more nearly natural; the skin becomes less hot and softer, but not always moist. The urine is more copious, and upon examination is found to deposit a sediment; which is not the case during the

remission. There is in short a partial subsidence of all the febrile symptoms, but a complete intermission or apyrexia does not take place. This decline of the fever is termed very properly a *remission*, and this gives name to the disease.

The remission usually occurs in the morning and continues from one to three hours. The next paroxysm or exacerbation then ensues, sometimes, but not generally preceded by a slight decline. The symptoms of the pyrexia are again fully developed, to be again followed by a remission on the succeeding day.

Such is the ordinary course of remittent fever. But it is subject to many modifications, all of which must tend to vary the symptoms and change the aspect, if they do not obscure the character of the disease. Sometimes there are two remissions in each day, at four hours, giving the disease the double quotidian type, though this is seldom the case. A majority of cases, according to observation, are of the tertian type, there being a more distinct remission every other day. Some cases again are quartan, having a more distinct remission every third day. This shows a peculiar difference between this and intermittent fever. Sometimes the remission is so very slight as to escape the notice of an inexperienced person. But by close attention to all the symptoms, the experienced physician will be able to recognize a declension. There is a slight decrease of heat, the pulse somewhat modified, and the nervous excitement slightly allayed. In fact, the symptoms during the remission will be found in different cases to vary from a mere excitement of the pulse, with almost an entire absence of other signs of fever, to that obscure declension above mentioned, marked only by a scarcely perceptible diminution of the febrile symptoms.

A frequent complication with remittent fever, especially in children, is congestion of the liver. The tongue in such a case is generally coated with a dark brown coat, and very dry, often cracked and raised up so that the patient can not protrude it beyond the mouth. This may be always regarded as indicative of congestion of the liver. In other cases, where the tongue is only slightly coated with a brownish fur, and with little dryness, there is irritation of the bowels. If diarrhea accompany, it shows that the congestion has passed to the bowels. Other complications and organic diseases of the liver in connection with this disease. This subject is more thoroughly discussed however, when we shall

approach the treatment of remittent fever. These instances have been introduced here, merely as examples of the modifying influence of such complications.

Here then you have a disease varying in importance from a slight febrile indisposition to the most grave form of congestive fever; a disease liable to modifications in its character—by the season of the year in which it occurs; by the peculiarities of the location, as regards the production of malaria; by the constitutional habit and condition of the patient; by complications with local affections; and sometimes by a general epidemic influence, rendering it peculiarly malignant. It is also essentially modified in its intensity by the mode of treatment. An injudicious treatment, especially if it be of the active, heroic kind, will most certainly render the disease more severe and unmanageable; while under a mild course of judicious measures, it seldom fails to assume a milder form and finally yield. Under such treatment the remission may generally be rendered more distinct, at first, and then changed to a perfect intermission on the following day; thus transforming it to an intermittent fever which will yield at once to antiperiodic remedies. Hence, you perceive the importance of a thorough acquaintance, not only with the symptoms of this form of fever, but with the remedies proper for its arrest, and the judicious mode of exhibiting them.

I have already said that we often have torpidity and engorgement of the liver; we sometimes on the other hand meet with an excessive secretion of bile; in other cases the liver is in a perfectly normal condition. This can not therefore be properly called a bilious fever, as depending upon hepatic derangement. I have so often seen this disease unassociated with biliary derangement, that I am compelled totally to reject the old dogma, that it depends necessarily upon an abnormal condition of the hepatic functions. You may rely upon it, that the condition of the liver is not to be taken into account in determining the cause of remittent fever: its derangement being a concomitant difficulty—generally in fact a result of the fever instead of a cause.

The stomach too, may be found in conditions very diversified in different cases. I have seen patients in this disease who retained a good relish for food, digestion appearing to be duly performed; others have exhibited a high state of gastric irritation, as evinced by the redness of the tongue, and tenderness in the epigastrium;

while in some, the stomach was in such a torpid condition that it was necessary to administer an emetic before the ordinary medicines would produce any impression on the mucous membrane of that organ.

The pulse, as has been already stated, varies very much in different individuals. It generally ranges from 80 to 100 per minute,—seldom exceeding the latter rate in ordinary cases; but in those of a more grave character you will often find it as high as 120 or 130, and sometimes, especially in delicate females, whose nervous systems are very sensitive, it will even reach 150 per minute.

This subject will be resumed to-morrow.

LECTURE VII.

MALARIAL FEVERS—CONTINUED.

Complications of Remittent Fever Continued: Inflammation of the Lungs; Disease of Spleen, Liver, Stomach; Local Disease Secondary; Cause of Bilious Fever; Endemic Character explained; Influence of age, sex, habit, etc.; Latent Period; Diagnosis; Prognosis; Duration; Post-mortem; Treatment; Old School Doctrines, Quotations, Remarks on Calomel, Bleeding; Dr. Wood on Mercury and Quinine; Reply.

REMITTENT FEVER—CONTINUED.

We will this morning, for the purpose of more fully illustrating and explaining our views of the nature of remittent fever, recur again to the complications with this disease frequently found in practice. We have previously said that the liver, stomach and bowels are often diseased in connection with this form of fever. The spleen also is very frequently involved, more so perhaps than any other organ. In many cases there is congestion, and sometimes inflammation of the brain. Now, although these different organs are often subjected to serious lesions in association with, and most generally resulting from, the malarial fever, they can not be regarded as the seat of the disease, nor their affections as primary difficulties to be treated for the arrest of the fever. This point was satisfactorily established in the last lecture; where it was shown that no one organ is always diseased; that the disease may exist in the system without any symptoms of local difficulty in any organ; and that every organ of the body has been found affected in some cases, and in perfect health in others.

Inflammation of the lungs is sometimes encountered during the progress of remittent fever, especially in the winter. This complication is one of very serious importance, and must be treated upon the general principles which will be presented when we come to treat of inflammation. I will however here remark, that its presence

will be no bar to the proper measures for arresting the remittent fever.

As has been repeatedly remarked, all the organs of the body are liable to suffer more or less under the influence of the fever of which we are speaking; but the spleen is more generally involved than any other viscus, though this is not necessarily nor uniformly the case. Being a reservoir for excessive accumulations of blood in the abdominal cavity, it is more liable to engorgement than the other viscera. This condition is so obscurely marked by symptoms, that it is only when the spleen is very much enlarged, producing a tumor in that part of the abdomen, that its condition will be recognized. As in intermittent so in remittent fever, the congestion of the spleen is beyond dispute caused by the malarial influence, and it will generally disappear after the fever is arrested; if not, it must then be treated as a special difficulty.

Where the liver is in a state of congestion, the tongue exhibits the dark brown coat, and dry contracted appearance before spoken of, and there is a yellowishness of the eyes and skin. This condition is very common in this disease during its progress; but there are so many instances where the disease makes considerable progress before biliary derangement is manifested, that we can not regard the liver as the primary point of attack; nor is it sound philosophy or good practice to delay the radical treatment of the disease until you have corrected this secondary disorder.

Irritation of the stomach and bowels, congestion of the brain, and other instances of local disease, will always be marked by the symptoms peculiar to each. When the stomach is seriously affected, it will be shown by the red tongue, by tenderness in the epigastrium, by nausea and perhaps vomiting. Soreness of the abdomen with diarrhea, a quickened pulse and an anxious, nervous restlessness, show an irritated condition of the bowels. Where cephalic congestion is present, there will be heat and pain in the head, dilatation of the pupils, dullness of sight and hearing and sometimes delirium or coma.

Such are the leading symptoms which the organic disorders or local determinations, incident to this disease, produce. Many of the authorities, regarding the local affection as the primary disease, have divided intermittent fever into the hepatic, gastric, splenic and cephalic modifications. But as it has been shown that the fever does not originate in any of the local organs, such a classification would be improper and tend to mislead. It should not

therefore be retained. We might, on equally good grounds, subdivide this or any other form of disease at will, were we to give a distinct name to every case which is complicated with one or more local difficulties. That these organic and functional derangements often seriously modify the fever, and ultimately require a corresponding modification in treatment, is certainly true; but they are only occasional attendants, and can not with propriety, be considered in any other light than that in which we have viewed them.

The arguments in favor of the doctrine that remittent fever is developed in the system from some local or organic disorder, are as futile when based upon pathological anatomy, as we have just found them to be when drawn from external symptoms. Post-mortem examinations following this disease, do, it is true, always exhibit important organic lesions; not however uniform in their locality or character. Sometimes one organ, sometimes another, and often several organs are found in an abnormal condition. But these lesions are found after the disease has run its course and worn down the patient by its inroads, until the vital powers have given away. This takes place after days and generally weeks of prostrating disease, and very often equally prostrating treatment; and when life is extinct and the internal organism submitted to autopsic examination, we are expected to decide where the disease made its first attack, or in other words, determine what was the condition of these organs before the disease had been established, or medicine administered. These examinations are important as means of revealing the internal changes indicated by symptoms before death. They may exhibit to us the footsteps of a protracted disease, and, it may be, the results of our medication; but they can not reveal the cause of disease, its mode or point of attack, nor its essential character.

Having disposed then of the groundless assumption, that this disease necessarily locates itself at some point in the body, and extends its morbid influence from that point to the entire system, it only remains for me to reiterate the opinion presented heretofore, while speaking of intermittent fever and of fevers in general. Had we the power to make observations sufficiently minute to detect those changes in the nervous tissue which the symptoms of this disease in its forming stage indicate, I believe we should then have autopsic evidence confirmatory of the doctrine which we have deduced from those symptoms, that this, as well as other forms of malarial fever, invades the constitution through the nervous system.

Having established this point, the successive steps and changes manifested in the disease are no longer involved in mystery; and if in addition to this, we have discovered a remedy which can relieve the nervous system from the oppressive power of the malarial poison, we shall be able to direct our efforts for effecting a cure, with a precision nearly equal to that of the fireman who pours a stream of water upon a burning house. [That the morbid impression of miasmatic poison is first experienced in the *sympathetic nervous system*, appears to me to be more fully established by every development in this department of pathological science. The influence of the sympathetic nerves in controlling calorification, secretion, and the metamorphosis of tissues, has been so clearly established by M. Cl. Bernard, Helmholtz, Ludwig, Axmann, H. F. Campbell, Marshall Hall, and others, that in febrile diseases not primarily characterized by depravity of the blood, we are compelled to regard that system as the point of invasion. Is it not probable also, that quinia and all other antiperiodic remedies display this property in proportion to the specific stimulation and support they afford to the sympathetic nervous system? S.]

But little need be said in relation to the *cause* of remittent fever. Very few individuals making any claim to scientific knowledge, now question the correctness of the opinion, that this disease results from the influence of marsh miasmata, or vegetable malaria. This is the doctrine of the books, the schools, and the profession generally. We do it is true, occasionally meet with an emanation from some unknown individual, who anxious for notoriety perhaps, or ambitious of being a public benefactor, treats the profession with a pamphlet, or it may be even an octavo volume, made up of what the author supposes to be logical reasoning (altogether theoretical in its character, however, and without any substantial data upon which to base his doctrine), to sustain the position that remittent fever is dependent on changes in the electrical condition of the atmosphere, or some other equally recondite, vague and unsatisfactory assumption.

But the clearly ascertained influence of vegetable decomposition, and the well-defined phenomena denoting the uniform connection of that influence with this disease, though not an absolute demonstration of the malarial origin of this form of fever, are little less satisfactory than the deductions drawn from an ordinary chemical process which none would question for a moment. I conclude

therefore without further argument, that this form of fever has the same cause as intermittent fever; to wit, malarial poison, resulting from the decay of vegetable matter. This view of the subject was the point from which I started in those experiments and reflections which finally resulted in an entire change of my mode of treatment. "It is a conceded point in the books," said I, "that intermittent and remittent fever have the same cause, in different degrees of concentration, or operating on different constitutions. Now if the former can be arrested by a few simple remedies, why not the latter, also, by the same remedies, more efficiently applied?" Such was my reasoning; and although previous teachings still incumbered and trammelled me, I felt my way along, as if groping in the dark, making experiments with more and more confidence, as success seemed to justify, until finally I found myself, almost unawares, occupying the bold position, that the authorities and the whole profession were wrong in regard to the treatment of bilious or remittent fever.

It is said that this disease occasionally *becomes endemic* in localities and regions of country where it was before unknown, and this fact has been adduced as a difficulty in the way of the malarial theory. But I do not perceive much force in the fact, as an objection to this doctrine, for it is certain that some change must have been effected in the vicinity to produce the disease, let its cause be what it may; and this change may be, and probably is in all such cases, one which spreads malaria over the district. A canal has been dug, a marsh drained, a stream become dry, or some other change of the face of the country has taken place, probably unnoticed by the inhabitants themselves, yet sufficient if rightly appreciated to account for the generation of the vegetable miasmata.

It is scarcely necessary to remark, that *all ages, sexes and conditions*, are liable to this disease; yet there is a *difference of susceptibility* in different constitutions. While some persons appear to be from some idiosyncrasy predisposed to its attacks, others are almost entirely exempt. Still no one may presume upon absolute exemption from the fact that he has hitherto escaped, for some change in the condition of his system may occur, unaware it may be to himself, which will not only bring him liable to, but even predispose him for, an invasion of malarial disease. It is said that remittent fever rarely occurs among the negroes of the Southern States, though they are not exempt from it. They are it seems less liable than the whites; for if statements which have been made can be

relied upon, there can be no doubt that the whites if exposed as the blacks are to the malarial influence, would suffer much more from this cause than do the latter. Whether their peculiar habits and mode of life fortify them against it, is a question which can not now perhaps be determined.

Persons *accustomed to reside* in a malarial region of country are less liable to this fever than those moving into such a place from districts where it does not prevail. The contrary also is said sometimes to be the case; that is, individuals who have resided for years where remittent fever was endemic without suffering the least symptom of the disease, have taken it immediately on removing to those hilly portions of New England where it never prevails. This is not easily accounted for. [Except on the supposition that the malarial poison is carried in the system, and the change of atmosphere, habits, etc., reduces the resisting power of the constitution. S.]

The *latent period*, or time elapsing between exposure to the cause of the disease and its development, is exceedingly variable. It is said in the books that some will take it within a few days after exposure, while in other cases a year will elapse before it will be developed. It may therefore be safely said that there is no settled rule on this point.

The *diagnosis* of remittent fever if suitable care be taken in the investigation of its history and character is easy and plain. Whatever the complications; whatever organs may be involved when you are called to a case; if the forming stage is characterized by the peculiar nervous symptoms which have been described, and you are able to detect a periodical tendency in the fever, either from its past history or by your own observation, and it is in a malarious locality, you may rest satisfied that you have a case of remittent fever. As has been repeatedly remarked, it does not depend upon local disease, and consequently no local symptoms are to be looked to as diagnostic of bilious fever; these may or may not be present, but the points above stated will be unfailing guides to the formation of a correct opinion of the case.

The *prognosis* under ordinary circumstances is favorable. If allowed to run its course unmolested, its tendency is to a favorable termination in about two weeks; for in a majority of cases the system is able to throw off the disease without assistance. But in its malignant forms, unless immediate and efficient aid is secured, the patient sinks into a typhoid condition and dies. Any modi-

fications which tend to render the remissions distinct, causing them to approximate more nearly to complete intermissions, are regarded as decidedly favorable; while those which produce a contrary effect—that is, render the remissions obscure and assimilate the disease to continued fever—as well as those which degenerate it into a low congestive form, are always unfavorable. The last mentioned condition, as has been before remarked, is often produced by harsh and unskillful treatment in the early stage of the disease; the stomach and other organs are thereby more thoroughly involved (as evinced by the increased severity of the symptoms, and finally demonstrated by post-mortem inspection), and thus, by the consequent diminution of the vital forces, the patient sinks an unresisting victim to the conjoined power of disease and medicine.

Generally however, the question of prognosis has reference rather to the duration than to the final termination of this disease. It is not whether the patient shall or shall not recover, but whether he shall languish for two, three, or more weeks, or be restored to health in as many days. And that such is the true question, community is now becoming apprized. Death would seldom result from this fever without medicine, and its former fatality was certainly owing to the radical errors which prevailed in regard to the disease and its treatment. It is not at all strange that it should have been regarded as a tedious and fatal malady, under the treatment so uniformly pursued by the profession.

Its *duration* therefore depends very much upon its treatment. The most recent authorities state the average duration at from ten to fifteen days, though sometimes protracted to four or more weeks. When malignant, it sometimes terminates fatally the second or third day. Dr. Wood, who puts the average duration at fourteen or fifteen days, adds: “Under *appropriate* treatment, it is often much shortened;” and I certainly agree with him. Under the treatment which I shall soon describe, and which I have pursued for many years, I feel safe in reducing the average duration to three or four days; and I pledge my reputation that my experience fully justifies me in so doing. This is not a disease that requires a protracted course of treatment, if properly managed in the beginning. It is not necessary that the vital powers of the system shall be almost exhausted in overcoming the malady. Nor is it necessary that we resort to a course of medication to repair local injuries produced by the fever; or to remove secondary disorders, before we direct our remedies to the primary disease. At

least I have not found such a practice necessary, in a long course of almost uninterrupted professional experience, in a district of country where this form of fever is remarkably prevalent, and where it often assumes a very severe character, and presents its most embarrassing complications.

Under the mode of treatment which I once pursued, in accordance with the generally received views of the nature of "bilious" fever, I occasionally lost a patient; but I am now very well convinced that nineteen-twentieths of those I lost would have been saved under my present mode of treatment. This is by no means a gratifying reflection I acknowledge; but I know that I did the best I could under the circumstances in which I was placed; that I took advantage of all the light that the profession enjoyed on this subject, and that my success was at least as good as that of my cotemporaries. But should I now lose a patient in remittent fever, where my prescriptions were promptly and thoroughly carried into effect, I should be exceedingly disappointed and mortified. I have not been accustomed to such a result for many years, and should certainly be taken by surprise to find myself discomfited now. I do not of course claim to be able to cure every case, under whatever circumstances it may occur. Neglect or mismanagement in the beginning, previous to my being called, or its being connected with some paramount disease of a fatal character, may prevent restoration to health; but even in such cases I have always been able to arrest the periodical fever, without ever aggravating the accompanying disease; and usually with a beneficial effect upon the general condition of the patient. But in uncomplicated remittent fever I never expect to lose a case where my prescriptions are followed; and even where complications exist, if the vital powers have not been undermined by disease or treatment before I am called, I certainly do not expect to lose one case in one hundred. I did not lose a single case from this disease during the past season, although I treated a large number.

In regard to *post-mortem* appearances, it is scarcely necessary to remark, further than to refer to what was said under intermittent fever. This disease it may be maintained never proves fatal in its simple form; and where death occurs from inflammation or congestion, the organ or organs affected will of course present the evidences of such disorder. If the mucous membrane of the stomach is inflamed, or that of the bowels, the appearances after death will be such as will be described under gastritis and enteritis. Inflam-

mation of the brain or of the lungs, if present, will be indicated by the pathological appearances of those affections. The liver will present different appearances according to the degree, duration and manner of its involvement. It is often entirely healthy, sometimes slightly engorged, perhaps enlarged; its color is sometimes changed to a dark slate color or to a kind of bronze. In protracted cases it is sometimes friable or softened, approaching disorganization. The spleen is very generally engorged and often enlarged to several times its natural size; usually softened, sometimes entirely broken down. Occasionally it is but little affected.

The blood in the commencement of this disease, presents no buffy coat according to old-school authority. Later in the course of the fever, when inflammation becomes superinduced, it is manifested by the buffy coat and cupped appearance of blood drawn from the system. After death it is much vitiated, containing elements of bile, in excessive quantity sometimes, and generally tending to rapid decomposition.

We come now to the *treatment* of remittent fever. With a view of affording you a truthful and satisfactory statement of the treatment confidently recommended by the recent and reputable authorities and generally adopted by the profession; and with a view also of placing such treatment in juxtaposition with a course of medication pursued by myself through a series of years and in thousands of cases, under highly concentrated malarial influences, and with the most satisfactory results; I propose now to read to you an extract from the writings of Dr. Wood, whose work on Theory and Practice of Medicine is in high repute, and goes very far in giving direction to the modes of medication among American practitioners. And I would fain call upon that author, for whom as a physician and gentleman I entertain profound respect, to review his practice, and test at the bedside of his patients the correctness of the doctrines I am endeavoring to elucidate, and the efficiency of the treatment I advocate. Could I have assurance that he would do this, I should expect very soon to hear from him an enthusiastic proclamation of a change in his views. Such an announcement from him, I should regard as one of the most fortunate events of the age; as it would prevent a vast amount of suffering and mortality, which must certainly result from the influence of his teaching. He says:

“After reaction, attention should, as a general rule, be first directed to the alimentary canal. At one time it was strongly recommended

to begin the treatment with an emetic; and many still adhere to practice. But, though in some instances this class of medicines appears to exercise a favorable influence upon the fever, moderating the frequency of pulse and the heat of skin, and calming cerebral excitement; yet, in others, it aggravates existing irritation of stomach, and perhaps determines the supervention of gastritis. This danger is generally thought to outweigh the probable advantage, and emetics have therefore fallen into comparative disuse. There is, however, one condition, early in the disease, which occasionally justifies and even demands their employment. Allusion is had to the presence of irritating substances in the stomach. These produce all the evil effects of emetics, and more continuously. The indication, therefore, for their evacuation is obvious."

* * * * *

"An active *cathartic* is almost always indicated. Either the portal circulation, including that of the liver, is congested, or the bowels are loaded with fecal and bilious accumulations, which act as a constant source of irritation and discomfort. Depletion and derivation from the brain are also desirable in this stage of the disease. On all these accounts, it is proper to give a full dose of purgative medicine. Calomel is beyond all comparison the best adapted to the case. It remains better than most others upon the stomach, and has a special tendency to act on the liver, the secretory function of which it promotes, and thereby unloads the portal circle, while it also tends to free the blood from the biliary matter which may have become redundant in that fluid. Experience, moreover, has almost universally pronounced in its favor." * * *

"The cathartic should be given, whether the patient be seen first during the paroxysm, or the remission. It will sometimes be better received by the stomach, and operate more kindly, in the latter state than in the former. Should the patient be unable to take calomel, as sometimes happens, in consequence of an idiosyncrasy which causes this medicine to occasion excessive pain in the stomach and bowels, the mercurial pill may be substituted, in the dose of ten or fifteen grains, combined with extract of jalap, rhubarb, etc.

"After the bowels have been thoroughly evacuated, it will be sufficient, as a general rule, during the remainder of the complaint, to keep them open once or twice daily. This is often effected by the medicines which are given for other purposes. If not, half an ounce or less of sulphate of magnesia, sulphate of soda, tartrate of

potassa and soda, or other saline purgative, a Sedlitz powder, a drachm of magnesia, or three or four fluid drachms of castor oil, may be given as circumstances seem to require. Sometimes it will be more convenient, and answer equally well, to effect the object by means of enemata.

“Another remedy, sometimes of great importance in the early stage of bilious fever, is *bleeding*. There are, however, many cases in which it is altogether unnecessary, and many in which it is positively hurtful. When the powers of life are feeble, or the system depressed by the coöperation of sedative agents with the main cause of the disease, it may even prostrate below the point of reaction. This is especially the case in tropical climates, where the continued influence of heat produces habitual relaxation, and fatal collapse in bilious fevers is not uncommon. The same may also be the case with persons debilitated by previous disease, or by intemperance, and in whom a typhus influence is operating conjointly with the miasmatic. Bleeding, therefore, must not be indiscriminately resorted to. It is wholly powerless in the eradication, or even in the control of the febrile movement.”

This is unquestionably true; and I can not possibly conceive of a case in which bleeding could effect any thing toward a removal of the disease. Can it ever do so? No man can sustain the affirmative. Then why resort to it? But Dr. Wood continues:

“The force of the pulse may be reduced and the strength of the body exhausted, and yet the fever shall not have abated an iota of its violence, or its duration.”

Another well settled truth; and yet bleeding is often of great importance in the “*early stage of bilious fever*.” How can a measure which is powerless to eradicate or even control the febrile excitement—although it may exhaust the strength of the body, and is often positively hurtful—be important in this disease? Let the same author answer:

“The only legitimate object of venesection in remittent fever, is the prevention of organic injury from inflammation or local determinations of blood. But as these are very often the immediate cause of death, it is often of the utmost importance to be able to control them, and bleeding is among our most efficient means for this purpose. Hence, the indication for this remedy is the positive or apprehended existence of inflammation, or of some active sanguineous congestion. But, though these constitute indications, there may be others which more than counterbalance them, and bleeding

is not always admissible, even in cases of inflammation. This may exist in connexion with an asthenic as well as a sthenic state of system; and it is very possible, in the former case, that in attempting to reduce the local disease, we may exhaust the little remaining strength, and thus disable the system from supporting the course of morbid actions, requisite to the restoration of health. There must, therefore, be not only inflammation, or threatening active congestion, or a reasonable fear of them; but also sufficient general energy to support the system through the disease, after the blood has been lost."

Several questions are suggested by the quotation just read. The first is, what relation does inflammation or active congestion, whether present or threatened, sustain to remittent fever? Is it the cause of the febrile disease? If the cause, then the local affection is the principal disease and the fever merely symptomatic or secondary. But if this be so, then this subject has been introduced by the author before us under the wrong head, for he is now treating of a disease caused, as he says, by vegetable miasmata, one in which many cases exhibit no "signs of any local affection sufficient to induce a fever." The next question which arises is this: where inflammation or congestion exists or is apprehended, is it not caused by the malarial fever? Dr. Wood admits, in another place, that these local difficulties are generally secondary, making their "appearance several days after the commencement of the attack," and I repeat, if they are not secondary, they should be treated of in their proper place. If then they are effects of the fever, what philosophy is there in employing a measure with special reference to their removal or prevention, which is "wholly powerless in the eradication or even in the control of the febrile movement," and therefore utterly inadequate to remove or modify the cause of the organic disorder? May not the fever produce local determinations even after the strength of your patient has been exhausted, and his system reduced to an asthenic state by the loss of blood? And if so, what measure will you then employ to relieve the inflamed or congested organ? Must every patient whose system is in an asthenic state, from whatever cause, be given up as lost on the supervention of a local determination of blood, for the reason that there is not strength to allow this measure to be employed? Especially, why bleed where "inflammation or some active sanguineous congestion" is merely apprehended? Are they not always to be apprehended in severe attacks of bilious

fever unless its progress can be arrested? Suppose you meet a case where a spike has been driven into the body of a man and remains there still. You know it is there and that you can extract it with little difficulty. But you have reason to apprehend inflammation in this case, certainly. Will you stop to bleed your patient before removing the irritating foreign body? Then why, let me ask, shall we stop to tamper with existing secondary disorders, or waste precious time and the strength of our patients, in apprehension of future difficulties, when we have in our hands the means of removing the malarial poison from the system, and thus eliminating at once the cause of both present and anticipated evil? That such resources are within the reach of the physician does not now admit of a doubt in my mind, and I hope to be able to satisfy you of the fact before the subject is dismissed.

Dr. Wood closes his remarks on blood-letting as follows: "It is seldom that more than one full bleeding is required in bilious fever. A moderate tentative bleeding, of six or eight ounces, may often be advantageously repeated; but after the loss of twelve, sixteen or twenty ounces of blood, or it may be in robust and plethoric men as much as thirty ounces, whatever more is done in this way should be accomplished by local depletion."

Notwithstanding such practice is regarded as proper by Dr. Wood and others, my observation would prevent me from testifying in favor of its propriety, or even its safety. I have never seen a case in which the lancet was employed with any evident advantage; but I have seen many instances where decided and unequivocal injury resulted from its use. I will mention one case: I was called to see a patient in remittent fever, who had been treated during five days by a physician of some reputation. He had bled him five times, taking at each time a quantity varying from a quart to a half pint, and still the disease was not cured, nor was it then in my power nor that of any other man, as I believe, to save the patient's life. I found him with a small vibrating pulse, with lips almost as pale as the sheets on which he lay, and a countenance as haggard as the corpse which he soon became. He sank and died, I have no doubt from the loss of blood drawn from him by his scientific medical attendant.

I continue to quote from Dr. Wood:

"After the evacuation of the *primæ viæ*, and the use of the lancet, if that may have been considered advisable, *diaphoretics* come in with great advantage. Some authors speak slightly of

these remedies. But when we consider that nature very often brings about a partial or complete solution of the paroxysm of fever by sweating, the inference appears very reasonable that we shall favor this result by promoting her own favorite process. Nor do I think that experience is opposed to this conclusion of the judgment. It has always appeared to me that diaphoresis, brought about by proper means, during the febrile exacerbation, often has a most happy effect in moderating its violence, shortening its duration, and rendering the subsequent remission more complete. Of course, the sweating is not to be induced by stimulating means. In the early stages, the *refrigerant diaphoretics* only should be employed. When the stomach is not in the least degree irritable, the *antimonials* may be used with advantage." * *

Refrigerant diaphoretics, and other mild, palliative means are certainly proper during the hot stage, to moderate its violence and shorten its duration. But in a disease, which like remittent fever is so generally attended by gastro-intestinal irritation, I could not think of prescribing in any stage, agents so likely to produce irritation of the stomach as the "antimonials." It is not pretended that they are curative, but merely palliative, and their irritating character will not be denied; all the good that can be effected by them can be as well accomplished by less irritant means; and by their administration that very condition which is always to be "apprehended" in this disease, is very likely to be developed. Whatever therefore may be said of their use in other forms of disease, they certainly should not be employed in this.

Dr. W. recommends as other measures, the effervescing draught, prepared with citric acid or lemon juice and carbonate of potassa; the neutral mixture or *liquor potassæ citratis* of the United States Dispensatory; the spirit of Mindererus; the warm bath; and also speaks favorably of the external application of cold water by sponging, but especially by effusion, and then says:

"In mild cases of remittent fever, few other remedies will be required beside those above detailed."

Let us here recapitulate. Emetics, cathartics, bleeding, diaphoretics, warm and cold water, are nearly all the remedies that will be required "*in mild cases.*" But the doctor adds: "When the remissions are very distinct, and approach the character of intermissions, the case may often be greatly hastened by the use of quinia." "But violent and threatening cases demand additional treatment."

I desire you will observe the peculiarity of the treatment we have been reviewing, that you may mark the contrast between it and that which will be presented in a short time as the practice of your present teacher. Remember that after the use of all the classes of medicines above enumerated, in mild cases, then, provided "the remissions are very distinct, and approach the character of intermissions, the cure may *often be greatly hastened* by the use of quinia." If the enemy has not been frightened from the citadel by these attacks upon the ramparts, his departure may finally be hastened by a shot or two aimed specifically at him.

Although the quotations which have now been made are sufficient to give a correct general outline of that mode of practice taught by Prof. Wood, yet I can not refrain from presenting an extract or two from his remarks on the use of mercury and quinia.

"*Mercury*," he says, "has enjoyed a very high and merited reputation in this disease. It has been frequently observed that few patients die of bilious fever whose systems have been brought under the influence of this remedy. The reply, indeed, has been made to this argument in its favor, that those cases only are susceptible to the action of mercury which can be cured by other means, or would get well spontaneously. But this is obviously assumption. Nor is the statement true. In cases which run their course in a few days, it is sometimes impossible to affect the mouth, but these are by no means the only dangerous cases, nor indeed a majority of them. In most instances the disease advances to the ninth day, or beyond it, before proving fatal. Of such cases there are very few in which the mercurial influence can not be established; and the inference is, that were proper attempts made to establish it, very few would end fatally."

Here permit a remark or two. What Dr. W. calls an "assumption" and pronounces untrue in the quotation just read, seems to me to amount almost to a self-evident proposition. The mercurial disease has been substituted for the original malady—a more potent morbid influence has taken the place of the malarial poison. Now if the system can sustain itself under, and finally throw off, this more powerful assault, would it not have been able to recover spontaneously, or by the aid of other means, from the attack of fever? But another reply may be made to the above argument in favor of mercury. If it be true that "few patients die of *bilious fever* whose systems have been brought under the influence of this remedy," it is unquestionably true that many have

died from mercurial disease where the original attack was bilious fever. In other words, we have no guaranty that the patient will be restored to health in the fact that his system has been mercurialized, as hundreds of fatal cases, and hundreds more of broken down and debilitated constitutions in this Western country amply prove. Further, it is admitted that mercury can effect nothing in those "cases which run their course in a few days," while there are a few—"very few cases," it is true, as claimed—still there are cases in which the disease has advanced to the ninth day, or beyond it, yet "in which the mercurial influence can not be established." Now I undertake to say that there are but "very few" cases of those which "advance to the ninth day" that would not recover spontaneously; and that in almost every instance, the disease may be arrested by proper treatment long before the ninth day. So that I am fully convinced that the use of mercury greatly increases the mortality following attacks of this disease, and that it protracts the sickness, and renders recovery tedious in a large majority of cases which finally get well, while it produces permanent injury in a great many constitutions.

Dr. W. continues: "Another argument against the use of mercury, is its liability to produce serious and even dangerous disease of the mouth. This very rarely happens, when the remedy is properly managed. I have never, in my public or private practice, witnessed a case of deformity or death from this cause. It is true that, from idiosyncrasies, patients are sometimes violently affected by the medicine, however carefully employed. But this is no reason for abandoning its use altogether. There is no efficient remedy of which the same may not be said. Death has often resulted from erysipelas following wounds; but patients are not, on this account, to be deprived of all the advantages resulting from the knife of the surgeon."

In reply I say, that were it the natural tendency of the surgeon's knife to produce erysipelas; did it require some peculiar management to prevent such a result, not only in cases of idiosyncrasy but in all cases, and could all the advantages of surgical operations be as well or more certainly attained by other means, I should most assuredly reject the knife altogether. And such must be shown to be the facts, to make the two cases at all analogous, and give any degree of pertinency to the learned doctor's illustration. It is certainly the tendency of mercurial influence when fully established, to produce not only serious and dangerous disease of the mouth,

but general constitutional derangement; and it is equally certain that no management can, in many instances, control its action; and that it is impossible ever to foresee its effect in any given case. The idiosyncrasies admitted to exist, and which are much more numerous than Dr. Wood's experience would seem to indicate, are sufficient to render its effect always uncertain; but when we take into account the many peculiarities of condition which may modify its action, it is impossible in any case to foretell its effect. Suppose for instance, calomel, or the chloride of mercury, the form generally employed, be given in the ordinary dose; and suppose the calomel thus given should obtain another equivalent of chlorine from the common salt (chloride of sodium), with which it is so likely to meet in the stomach, and thus be converted into corrosive sublimate (bi-chloride of mercury). That such a change may occur in the stomach can not be successfully denied: see the article on calomel in the United States Dispensatory. Now what physician can pre-determine to what extent this change will take place when he prescribes a dose of calomel, and what man fully realizing the possible result, would not eagerly seize upon any well attested and safe substitute? Well, gentlemen, such a substitute has been discovered for this dangerous agent, as you will be convinced I trust, during the progress of the present course of lectures.

The treatment of this disease will be given in the next lecture.

LECTURE VIII.

MALARIAL FEVERS—CONTINUED.

Remittent Fever continued: Treatment; Palliate till Fever begins to Decline; Antiperiodics—Recipe; If not arrested the first day repeat; Emetics considered; Cathartics considered; Treatment has reference to Paroxysm; Tonics, when necessary; Different Complications; Gastro-intestinal Symptoms, Treatment; Congestive Variety—Symptoms—Treatment; Over-action of Liver—Remedy for; Determination to Brain—Symptoms—Treatment; General Remarks; Typhoid Symptoms;—Management of such cases; Diet and Exercise.

REMITTENT FEVER CONTINUED.

Treatment.—In describing the treatment for remittent fever, which in my view is at the same time the most safe and the most efficient, I shall assume no position which can not be sustained by facts and observations occurring during an experience of many years. I have already given you a synopsis of the views of one of the most lucid and popular authors of the present age, and by reference to the work from which I quoted yesterday, you can read his opinions *in extenso*. With him I have the pleasure of coinciding in many points; but in regard to the radical means and mode of treating bilious fever, I must essentially differ from him. And so also with reference to other authors whose works are in every medical library; while they all agree in some particulars and disagree in others, I, too, claim the privilege of thinking and observing for myself, and where experience requires it, I shall even venture to differ from them all. For whatever arguments, opinions or doctrines may be advanced by others; however plausible their theories, and however laboriously sustained by finely drawn flourishes and speculations, the actual and daily experience of one practical, observing person, is more to be relied upon than the whole combined.

As an individual I claim to have made some observations, and

treasured up some facts, during my long experience in the treatment of this disease; and the views of treatment which are sustained by all those facts, and by every case I have ever seen, I can not abandon for the theoretical dogmas of any man or set of men. I feel bound by all the principles of right, truth and justice, to adhere to these views, and not from any egotistical partiality to my own opinions. I trust, not from a captious or controversial feeling in reference to the doctrines of others; for were I not impelled by a sense of duty to assume the position I do, it would be far from my desire to advocate doctrines averse to the majority of medical authorities.

Were the treatment I am about to suggest sustained by a few isolated cases merely, or by the application of remedies for only a short period of time, I should feel that I was dealing unjustly toward you, in recommending a different course of treatment from that laid down by the most recent authorities. But my present views are the result of experience in thousands of cases, observed during a series of years, in a country where the disease has presented all its various phases. I have tasted them in all the multiplied forms and modifications of the disease. I therefore feel great confidence in recommending them to your consideration, being assured that if you reduce my teaching to experiment you will realize results similar to those which have attended my practice.

I doubt not gentlemen, you have anticipated what I am about to present as the first and leading idea by which you should be governed in the *treatment of remittent fever*. I have heretofore laid it down as a general rule, and need scarcely repeat it here, that when upon careful inquiry and examination, you are satisfied that you have a clear case of periodic fever, you should first of all prescribe for that disease regardless of peculiarities, modifications or complications. By this I mean that you are not to adapt your treatment to the removal of local or secondary affections—such as congestion or inflammation of the liver, irritation of the stomach and bowels, etc.,—though these may be present; but exhibit at once those remedies which are adapted to any other form of periodic fever. First, eradicate the paramount disease, and then, provided the secondary disorders remain, it will be time enough to apply your remedies for their removal. Generally however, nature will be fully competent to complete the cure, after the periodic fever is subdued. But if you pursue a different course, and first treat the

local and secondary affections when present, or give medicine to prevent such as may be apprehended, you not only lose time which is of great importance, but the very measures you employ for such purposes will weaken your patient, irritate his nervous system, and very probably run him into a low grade of fever, from which it will be difficult for him to recover. I repeat therefore, and would do so with earnestness, do not wait to prepare nor deplete the patient, previous to the administration of antiperiodics, but administer them, give them regardless of irritation, congestion or inflammation,—and my word for it, in nine cases out of ten any local difficulty that may attend the disease will subside spontaneously, or be amenable to subsequent appropriate treatment. Were I partial to the lancet and to calomel as means for the reduction of inflammation, and had a case in which the inflammatory symptoms were unequivocal, I should, with my experience in view, defer the use of both until I had overcome the primary fever; for this can be done at once and with certainty, without ever aggravating the inflammation, and generally with a contrary effect.

When first called to a case of remittent fever, if you find the patient in the hot stage or exacerbation of fever, you should employ means to palliate as much as possible the febrile action. Bathe the surface frequently with weak ley and whisky, and give mild, soothing diaphoretics, so as to quiet the nervous excitement. This course will accomplish two objects: it will satisfy your patient, who will expect something to be done for him at once, and it will probably shorten the exacerbation.

When the time for a remission approaches, whether there is much sensible decline of the fever or not, come in with the antiperiodic remedies. My usual prescription under these circumstances, is

R. Sulphate of Quinia,	}	<i>āā</i> gr. iij.
Ferrocyanuret of Iron,		

Mix and give in sirup or sweetened water every two hours, until five doses have been administered. Should the fever rise before the five powders have been given, desist during the exacerbation, and commence again with the next remission. When the powders have to be thus suspended, it will be well to continue them during the next remission until, all together, six or eight have been taken.

After the administration of one or two of these powders, a gradual subsidence of the fever will generally occur, and a gentle perspiration break out over the entire surface; and in four-fifths of

the cases which occur in ordinary practice, five powders will be sufficient to effect the cure,—the fever seeming to disappear under the influence of the medicine as dew before the sun. In many cases too, where symptoms of local congestion are present, they will disappear with the fever or soon after it, and the patient be restored to health without further medication.

When the fever is more obstinate, and rises under the administration of the medicine, you should as above stated desist until the exacerbation begins to subside, palliating as at first during its continuance, and upon its decline resume your antiperiodic treatment. And now you will find, that although you did not prevent an exacerbation by your first prescription, you have nevertheless gained much by it; for the succeeding remission is longer and much more complete; and it is a very rare case indeed which does not yield during the second remission. And if this be not the result, the next exacerbation will be still more mild and followed by a complete intermission; and two or three more powders of the quinia and iron will be sufficient to completely arrest the disease.

The course just described will most assuredly break up the periodic fever. There may it is true be some local or general disease, which although perhaps caused by the malarial fever, has become fixed in the system; and this may now operate as a cause of continued febrile excitement. But this is not remittent or bilious fever, and is not marked with the same symptoms. The latter disease has been eradicated, and you have now to treat the remaining disorder, of whatever character, upon general principles. I shall speak more particularly of this subject further on, but will here again assure you, that you will always find it a much more easy task to treat such affections after the malarial fever is arrested than before.

I have now described to you my mode of treatment in an ordinary case of remittent fever. To say that it must not or should not be varied would be absurd. The discrimination and sound judgment of the physician will always be in requisition, even in the simple course which I have laid down. The age, sex and constitution of the patient, the type of the disease, and the malignancy of the attack, should all be considered in determining upon the size and frequency of the doses, and the time at which it is best to commence the administration of the antiperiodic medicine. In a mild or even ordinary case, the moderate course above described is sufficiently efficient to arrest the disease, while it does

not overwhelm the patient with the influence of medicine. But in urgent cases, where there is danger that the patient may be overpowered speedily by the disease, and the remission is likely to be short, the medicine should certainly be given in doses much larger than those I have specified.

You will doubtless have noticed that I have made no mention of emetics, cathartics or the lancet, as agents necessary in the treatment of this disease. However important evacuents and depletives may be in the estimation of others, as preliminary to the exhibition of quinia, they form no part of my treatment for the removal of this or any other form of malarial fever, for the conclusive reason that the fever does not arise from accumulations nor repletion. If you ask what I do where there are evidently accumulations in the stomach and bowels? I reply, that where the stomach is oppressed with undigested food or acrid secretions, I should give an emetic, and in case of undoubted accumulations in the bowels, I should unload them by a mild cathartic; but in either case I should not wait for the remission before employing these measures, neither should I allow them to prevent the administration of the antiperiodics during the first remission. If an emetic is deemed important, its administration will require but a short time and it may be given during the paroxysm, with the effect, frequently, of shortening its duration. When thus employed, I regard it as a palliative, and not as a radical measure. So also of cathartics, whether given with a view of unloading the bowels merely, or for the purpose of stimulating the liver, or both. They are mere adjuvants which when indicated by urgent symptoms, may give comfort to the patient and hasten a return of healthy action. Still no time should be lost for their administration. The good they may do in any case as preliminary measures, is much overbalanced by one febrile exacerbation. But when necessary, both may be given together. When the time arrives for the patient to take the antiperiodic powders, a sufficient portion of podophyllin and leptandrin may be combined with the first dose of quinia and iron, to evacuate the bowels, if that is deemed necessary, but where the cholagogue effect merely is desired, smaller portions of the same medicines may be combined with every alternate powder.

Another peculiarity in my mode of treatment has not failed I suppose to attract your notice. I refer to the fact that I administer the antiperiodics in the very first remission however slight, and do not wait according to the old system, until a complete inter-

mission is produced. In other words, I do not consider the mere presence of fever, any more than that of irritation, congestion or inflammation, as contraindicating the radical treatment for remittent fever. "Why then," perhaps you ask, "do you not give the antiperiodic medicine during the exacerbation?" I reply, that there is no serious objection to it, that I have done so under certain circumstances, and never saw any reason to regret it. It does not increase the heat of the body, nor the force or frequency of the pulse. This is evident also from the fact, that a paroxysm of fever occurring after the administration of the antiperiodic medicines, and while the patient is under their influence to some extent, is seldom as severe as might have been expected had nothing been done during the remission. Still where there is no necessity for a change, I prefer to conform to the usual mode, and prescribe the antiperiodic remedies during the remission. I base this preference upon the fact that no time is lost by waiting for the remission in ordinary cases, especially if we commence our radical measures as soon as the fever begins evidently to decline. It is highly probable that the stomach during the exacerbation, is not in a condition to respond promptly to the medicine, as the function of absorption is to some extent arrested, which would cause the medicine to lie inoperative in the primæ viæ until the exacerbation begins to pass off, and the organs in a measure resume their functions. The presence of these medicines in contact with the mucous membrane of the stomach, it is possible, may tend to increase the nervous symptoms so unpleasant in the hot stage, and thus add to the discomfort of the patient. In this way the medicine appears to coincide temporarily with the fever, during that part of the struggle in which the disease has the ascendancy of the powers of the system; while if given at the decline of fever, when the system is recovering from the shock, it comes in opportunely to the support of the nervous system, strengthens it for the next encounter, and thus, by coinciding with and assisting the natural powers of resistance, gives the disease its passport. Such I am confident is the ultimate effect also of these remedies, even when given during the rise of the fever. The unpleasant effects are but transient, and the medicine ultimately exerts fully its curative influence. So that after all the preference for the remission as the time for giving the antiperiodics, refers to the comfort of the patient, and not to the final result. It is better to palliate the febrile excitement, and hasten as far as possible a termination of the

exacerbation, and then come in with the radical measures at the first moment in which they will probably be of service.

On some occasions, however, when I anticipated a very slight remission, and was anxious to get the system under the influence of the antiperiodic remedies as soon as possible, I have commenced at once with them regardless of the febrile exacerbation, and as before remarked, without any thing occurring to cause me to regret the prescription. Indeed I have sometimes entertained doubts whether there are any unpleasant temporary effects to be apprehended from such a course; and I have almost concluded that the preference for the remission is based upon an ideal rather than a real objection. Of one thing I am certain; which is, that when the quinia and iron have been combined with a cholagogue aperient and given in the hot stage, no unpleasant symptoms have ever followed in my practice, and I have frequently prescribed them in that way. For instance, I am called to a case in the evening, while the fever is rising, and it is probable there will be but a very brief remission in the morning. The bowels are impacted, the liver torpid, and all the symptoms admonish me that no time is to be lost, but that every stroke should be made to tell. Now in this case, the patient being an adult male of ordinary constitution, my prescription is three or four grains each of the sulphate of quinia and prussiate of iron, with one-fourth of a grain of podophyllin and half a grain of leptandrin. And the result for which I look with confidence, in addition to the cholagogue and cathartic effect, is an earlier decline of the fever, a more distinct and durable remission, and consequently more time in which to give medicine for the arrest of the disease, than could have been gained by any other course.

The foregoing treatment has reference mainly to the arrest of the paroxysms of fever. If however, this is accomplished by the means I have mentioned before the disease has progressed very far, little further medication is necessary. The system not having been much debilitated by either disease or treatment, the patient will recover his strength and ordinary vigor with little assistance from medicine. Should the bowels be tardy in assuming their regular action, a mild aperient will set them right; and should there continue some torpidity of the liver, the aperient should possess cholagogue properties. Any other function which may appear torpid or languid, may be corrected also by the appropriate means. But generally, nothing of this kind is required in the convalescent stage of uncomplicated bilious fever, if it has been properly treated at

an early period after the attack. Attention to the diet, which should be wholesome and digestible but not low, though moderate as to quantity, and care to avoid exposure or over-exercise, will be sufficient in such cases to secure a complete restoration to health, with scarcely an exception.

Where the constitution was feeble previous to the attack, or the proper treatment has not been employed until the system is debilitated, although there may be no complication nor local difficulty remaining, there is frequently a want of sufficient vital energy in the system to commence and carry on the recuperative process. In such cases, the use of stimulant tonics with some mild alterative medicine is necessary; and I know of no better prescription in this case than the comp. tinct. tamarac, of which a recipe was given in the treatment of intermittent fever, page 314. The podophyllum may be added or not according to the indication in the case, and the dose should be regulated by the effect produced on the stomach and bowels.

Where complications exist in connection with this disease, or where inflammation, congestion or irritation has been produced by it, the subsequent treatment may be much more difficult. Though where the accompanying disorder is the result of the remittent fever, it must have become very deeply fixed indeed, if it does not disappear very soon after the arrest of the paroxysms. Where such is not the case, the secondary affection is to be regarded as an independent disease and treated accordingly. The treatment for the more common disorders of this kind will now be given. Where the coëxistent disease has had an independent origin, as where malarial fever is complicated with small-pox, scarlatina, pneumonia, etc., the remaining disease will of course be amenable to the treatment described under the appropriate head.

Gastro-Intestinal Irritation. If the stomach and bowels have become irritated during the progress, and remain so after the arrest of the periodical fever, the case should be treated cautiously and mildly. There will generally in such cases be nausea, perhaps vomiting, distress in the abdomen, and frequently diarrhea. The tongue will be red, nearly or quite clean, but not dry in the condition of which I now speak; and there will be discovered tenderness under pressure in the epigastrium, and perhaps in other regions of the abdomen. The evacuations are mucous and slimy, or very thin and light-colored. For, concurrent with the irritated state of the alimentary canal, there is generally a torpid condition of the

liver. In this case my practice is to suspend all active internal means and adopt a mild, soothing course of treatment. With this view, I direct the patient to drink a cold infusion of the *althæa officinalis* or *ulmus fulva*, and put him upon a very light diet—as rice or barley gruel. If there is much distress I give a small morphine powder, but avoid this whenever I can well do so. Externally, I apply large cataplasms of bread and milk over the stomach and bowels, and sinapisms to the wrists and feet to invite the circulation to the extremities. The cataplasm should be renewed from time to time to prevent its becoming dry, and the sinapisms may be taken off when no longer tolerated, and if the extremities are cold, applied to new places or to the same places after the lapse of a short time. The whole surface should be bathed frequently with weak ley and whisky. This is a very important measure, and should by no means be neglected. So long as there is either heat or dryness of the skin, the bath should be applied several times every day; this may be done with a sponge or towel, followed by brisk friction. If there is diarrhea the foregoing treatment will probably correct it, and if not, it may be controlled by the use of an injection of starch with a small quantity of laudanum after each discharge.

It has already been remarked that this gastro-intestinal irritation is accompanied by torpor of the biliary function. Under these circumstances the first impulse would be, in the mind of an inexperienced practitioner, to prescribe a cholagogue medicine: and calomel or podophyllin would be called into service, according to his peculiar views. Such a course will most certainly do harm rather than good, by aggravating the irritation of the stomach and bowels, while it will leave the liver unrelieved. It is frequently this very intestinal irritation which has extended by sympathy to the hepatic system and thus locked it up. In this state of things it is vain to hope for a cholagogue effect from any agents thrown into the stomach; the existing irritation must be removed, or much alleviated, before the mucous surfaces will respond to medicines adapted to stimulate the liver or other secreting organs. Nor is it desirable, under such circumstances, to cause the liver to disgorge itself, and throw its vitiated, acrid secretions into the already irritated intestines. Indeed we should rather regard the suspension of the biliary discharge as a beneficent provision of nature, to allow time for the healing of the abraded and irritated mucous surface. And this view of the case is confirmed by my experience,

and if you follow my advice will I have no doubt be confirmed by yours. Let the liver alone and pursue the mild, soothing and revulsive course I have described, and about the time the gastro-intestinal irritation subsides, you will in a large majority of cases, find the liver voluntarily assuming its function; and convalescence will progress rapidly with little further assistance. But should the liver continue torpid after the gastro-intestinal irritation has been relieved, it will then be proper to put the patient upon a mild cholagogue course of treatment; and the most appropriate medicine in this case which I have tried, is a pill night and morning of one-eighth of a grain of podophyllin, one-fourth of a grain of leptandrin, and a sufficient quantity of the extract of taraxacum. [I have found one-fourth of a grain of iridin to be a valuable addition to this pill, in such cases. S.]

Hepatic Disorder. Cases occasionally occur in which the liver is very seriously disordered. In some instances there is a great redundancy of the biliary secretion in the beginning, followed by a state of hepatic torpor; and if the fever continue, a congestion of the portal and hepatic veins follows, resulting in a serious and sometimes very stubborn engorgement, if not in inflammation of the viscus; which will remain to be treated after the malarial fever shall have been arrested. Or this condition of the liver may be the result of a high grade of fever, producing a tendency to local congestion; while a predisposition to hepatic disorder invites the determination of blood to the liver, even where the biliary secretion was not at first materially disturbed.

This condition of the system will be indicated by the tongue being husky and dry, and dark-colored in the center, while the edges may be moist and red; by the yellowness of the skin and eyes; by the condition of the urine, which is scant and very dark, sometimes almost black; and by the absence of biliary matter in the alvine discharges.

It will be recollected that I spoke a short time since, of combining a portion of podophyllin and leptandrin with the antiperiodic remedies, under certain circumstances. Well, we are now considering the very condition of the system in which I should pursue that course. If when called to the case, I found the symptoms I have just described, unaccompanied by much irritation of the stomach and bowels, I should commence at once the administration of the cholagogue medicine, in conjunction with the quinia and iron; and if the liver were not relieved upon the arrest of the

paroxysms, I should continue it alone until the biliary secretion was reëstablished. The dose would be in such a case, podophyllin one-fourth of a grain, and leptandrin one-half a grain; or

R. Podophyllin, gr. j.

Leptandrin, gr. ij.

Sanguinarin, gr. ij.

Ext. of taraxacum, q. s.—M. Ft. pil. No. iv. S.

One to be given every sixth hour until a bilious discharge is produced.

Whether the podophyllin and leptandrin be employed in powder, or the above pill be used, care must be taken not to produce a too active cathartic effect. Should the bowels be moved much the doses must be diminished. An emetic administered either before or after the arrest of the fever, will do much to arouse the liver and produce that general reëction in the system which is favorable to the result desired in this case; and where not specially contraïdicated by other symptoms, I have no hesitancy in resorting to the measure.

If the liver continue congested after the use of the medicines spoken of for a reasonable time (which, however, is seldom the case), the use of cups over the liver followed by hot fomentations, will be of decided advantage. The surface should in this case also be frequently bathed with broke water and whisky. The use of warm balm tea as a drink will generally be grateful to the patient, allay thirst, and promote diaphoresis. The diet should of course be very light and bland.

Upon a return of the biliary secretion there may be a tendency to overaction of the liver, and a bilious diarrhea may follow, especially if there be considerable irritation of the bowels. This will generally be sufficiently restrained by the use of one-eighth of a grain of morphine, combined with two grains of the extract of catechu, or with four grains of the extract of hæmatoxylon campechianum, once in two, four, or six hours, according to the urgency of the case.

Determination to the Brain. As stated before while describing the modifications of remittent fever, we often meet with cases in which there is determination of blood to the brain, as indicated by heat and pain in the head, dilatation of the pupils, dullness of sight and hearing, with delirium, and it may be a tendency to coma. These cerebral symptoms may appear early in the disease, or they may supervene at a later period. After the arrest of the periodic

fever, if these symptoms of cephalic congestion continue, measures must be adopted for relieving the brain. In fact, such palliative and revulsive means as shall not contravene the use of antiperiodic agents, will be proper at any period of the case, when these symptoms are present; though there is little hope of material relief, until the febrile exacerbations are prevented.

The treatment for this difficulty will have reference to a reduction of heat in the head, and a diversion of blood from the cerebral vessels. To effect the first of these indications, it is customary with authors to recommend cold applications to the head—as ice, ice-cold water, cold water poured from a considerable height, etc. To all cold applications, under such circumstances, I have serious objections, based as I think upon sound philosophy as well as experience. The shock produced by the sudden application of cold to the surface must tend to produce a reaction, which will increase the very difficulty for the relief of which it is employed. The only way in which it is possible to prevent the evil effects of such a reaction, after commencing the use of ice or cold water, is to see that the applications are constantly so cold as to absorb the caloric as fast as it is generated; and all who have experienced the difficulty of doing this, and especially of having it done by others; all who have seen as I have, the head of the patient swamped in a wet pillow, and cloths made steaming hot by the reaction, while the cold was still faithfully applied in the form of cloths wet in cold water, or ice melting and drenching the pillow, must with me, object to such means and seek if possible a better way. And there is a better way, and that is, to use warm water instead of cold, with the addition of alcohol or whisky as an evaporating bath. This should be applied with a sponge or towel, and followed by a gentle fanning to favor the evaporation. Here you have no shock, and no reaction is awakened; the pillow and bed of the patient are preserved dry and comfortable, while the real temperature, not of the surface merely, will be promptly diminished to any desirable degree. Warm water is preferable, not merely because it does not shock the surface, but because it will the sooner evaporate, and thus by assuming the æriform state, conduct the caloric from the part with great rapidity. If any one desires to test the truth of this philosophy, let him take a ball of snow or ice in one hand, and have the other treated with warm bathing and fanning, as above directed, and he will not long remain unconvinced.

To meet the other indication, *pediluvia* of hot water to which

mustard may be added, will be proper if the feet are cool. Sinapisms to the feet and hands are also well adapted to divert the circulation to the extremities. If the condition of the system will justify, hydragogue cathartics will be of much advantage. Cups or leeches may be applied to the temples and nape of the neck in urgent cases, and the blood may be retained in the veins of the extremities by means of ligatures applied to the arms and thighs, so tight as to interrupt the venous but not the arterial circulation.

' I have now given you the leading features of my practice in the ordinary forms and modifications of this important disease. Other modifications and complications and the anomalous phases which it may occasionally assume, must be treated upon general principles. It is impracticable for a teacher to detail every peculiarity which has been or may be observed as connected with a disease; and it is equally impracticable to describe all the minutiae of treatment which it may be proper to employ. Much must be left to the judgment, discretion, and if you please, invention of the attending physician. The general outlines have been given of a mode of treatment which if followed out and applied with judgment and assiduity, will seldom fail of success. The secondary affections which have occupied so much of our time, and which really constitute the principal, if not the only alarming features of the disease, will seldom give any trouble if you treat the disease in the beginning as I have directed; but should any of the local disorders before described persist after the arrest of the paroxysms, they will scarcely fail to yield to the treatment I have suggested as applicable to each case.

Sometimes however, in spite of all your efforts and measures you will fail of accomplishing a cure; or if you do not finally lose your patient, the case may assume a low congestive or typhus character, from which condition he will be raised with difficulty. Generally, cases of this kind may be traced to neglect of proper means in the early days of the fever, before structural lesions of the organs were produced, or what is worse, to palpable maltreatment—such as the use of drastic purges and harsh emetics, or the abstraction of blood; all of which tend to weaken the powers of life, and give the disease a predominating power in the system. Such cases I am sorry to say are not limited to the patients of medical practitioners, who must bear the odium of unsuccessful practice, but very often the patient, anxious to avoid expense, resorts to calomel, or some domestic or patent purge, or other

means equally injudicious, and having fairly installed the disease in his system, at last calls in a physician.

In other cases there is from predisposition, a tendency to congestion and nervous debility which in spite of medicine degenerates into the low febrile condition of which I have just spoken. This condition is characterized by a dry skin, occasional flashes of heat, a frequent, wiry pulse, an irritated state of the stomach and bowels, a contracted, red, dry, tremulous tongue, an anxious, sometimes slightly wild expression of the countenance, dullness of hearing, great restlessness, or it may be a tendency to stupor, low or incoherent muttering when partially aroused, involuntary muscular motions indicative of nervous derangement, a twitching of the extremities, which ultimately results in *subsultus tendinum*, picking at the bedclothes, or reaching unconsciously about, as if for objects in the air. In short, the case assumes all the important symptoms of, and may now be with propriety denominated, *typhus fever*; it is therefore amenable to the treatment which will hereafter be directed for that form of fever. I will however take occasion here to say that this condition will not admit of much medication. You will of course be expected to do something continually, or your patient will lose confidence or become discouraged; but let all you do be harmless, mild, and soothing. The sponge bath to the whole surface of warm water and spirits; mucilaginous drinks; a solution of ammonia, say ten grains, in four ounces of water, to allay thirst, stimulate slightly the capillary circulation, and to correct, in some measure, the secretions; gentle and bland enema to soothe the bowels, and if they are much disturbed a cataplasm on the abdomen, or a hot fomentation of hops; in case of much nervous disturbance sinapisms to the extremities and evaporating lotions to the head, if hot; and other kindred measures, will be your reliance in this case, so far as medicine is concerned. Your main reliance however will be in the recuperative power of nature. Assist her where you are certain you can do so, but where there is doubt, withhold. Do not here resort to doubtful experiments where a slight mis-step may be fatal. For my part, I much prefer trusting to nature where I am uncertain how to proceed. The mode of groping in the dark and striking at random has already done so much harm, that I feel anxious to see it universally abandoned. Where we know not what to do let us do nothing; or if we must do something let us at least do no harm. Where our own experience, or that of others entitled to

our confidence, warrants a measure, let us apply it judiciously and with caution. But in these delicate cases where life is suspended by so slender a thread, which one ungentle touch may separate, let us never give up experience for theory or experiment.

This may be called empiricism: be it so. If by empiricism is meant a careful mode of practice, based upon experience and enlightened judgment, and guided by nature where science fails, let me be an empiric, rather than one of those who require experience, reason and nature, all to bend to science, so called, at whatever expense of health and life. I am not at all disposed to adopt the sentiments of a late celebrated Professor of the Baltimore school, who would advise his class when called to a patient, to first turn the old women out of the room and nature out of doors, and then go to work. Now I have no particular antipathy to the presence of old women in the sick room, nor do I object to receiving from them valuable information: an important practical truth has as much intrinsic value when received from the lips of an old woman, as when obtained from the most scientific doctor of medicine; and without nature in the house, I should feel very much like closing my lips and departing in silence: I should think I had no business there. If I can not have nature in the vigor of health for my guide, let me be admonished by her feebleness to do no violence at least; and where I can not hear her voice, let me follow her footprints.

Convalescence in protracted cases will be slow and occasionally tedious; especially in those cases connected with much gastrointestinal irritation. It behooves you therefore, to admonish your patients of the necessity for great care and circumspection, both in regard to diet and exercise, for a number of days after you think it no longer necessary to continue your visits. Without this, relapse may be feared and will often follow.

The diet should at first be light but nutritious,—plain animal broths, ripe and well-cooked potatoes, rice or farina, and stale bread with a small portion of well-cooked, ripe fruit, will be the main articles to be relied on; while very moderate exercise—at first about the house, and as the strength improves riding in the open air—should be commenced with great care, and increased as the patient's strength will admit.

Tonics are of great consideration in those cases where they can be borne. But in cases connected with a red tongue and accelerated pulse, few if any tonics will be tolerated, and these alone without

stimulants. The *ptelea trifoliata*, or swamp dogwood, may be mentioned as one of this class, and may be given in such cases with entire safety, and generally with decided advantage. It may be administered in half-ounce doses of the cold infusion once in six hours. But in other instances where there is much debility, with a slow pulse and pale tongue, more decided and stimulating tonics will be demanded. Under such circumstances the common gin bitters heretofore spoken of will be found a valuable and safe prescription; or the use of Scotch ale with the meals, if the bowels do not require aperients, will be sufficient.

[The addition of tinc. of prickly ash berries, or the simple tinc. of Virginia snakeroot, in small quantity, to the infusion of swamp dogwood, is sometimes highly beneficial. S.]

LECTURE IX.

MALARIAL FEVERS—CONTINUED.

Congestive Fever: Preliminary Remarks; Dr. Armstrong's Views; Synonymous with Typhus; Malarial Origin; Not Contagious, Mere Modification of Bilious Fever; Symptoms; Treatment, Palliative and Radical; Complications — Gastro-intestinal Disorder, Hepatic Disorder, Treatment; General Remarks and Directions.

CONGESTIVE FEVER.*

It will not be expected that I shall be able to present you with all the phases and peculiarities of every case to be met with in practice. It will be sufficient if I succeed in giving you clearly the outlines, or principal features of the different forms of disease, as they come up for consideration. I have endeavored to describe to you as correctly as possible, the general character and peculiarities of remittent fever. But there are a few other phases of this disease, occasionally to be observed, which in many respects possess much practical importance, and I desire at this time to present them to you. And first I invite your attention to what I have been accustomed to call *congestive fever*.

This term probably expresses more fully the condition of the system, and especially of many of the organs, than any other. This variety of fever is described in the books generally under the head of *typhus* fever, and on this account you may perhaps, suppose that I am confounding the malarial diseases of this country with another of a peculiar and distinct character. But I do not believe there is any difference between that peculiar phase of malarial fever, commonly known in the West as congestive fever, and the typhus fever of the books. And this view is not peculiar to myself; for although many, perhaps a majority of the authorities consider typhus fever to be a distinct and contagious disease, different in its essential character from all the diseases peculiar to the Western

* See note at the close of this lecture. S.

country ; still there are some who, depending on their own observations, and reflecting on what they have seen, have arrived at the same conclusion with myself, and fully believe that typhus is simply a modification of malarial intermittent or remittent fever ; presenting symptoms common to both and evidently referable to the same cause. And at what other conclusion can we arrive in view of the well attested facts ? All who have had much experience in these diseases know that intermittent and remittent fever frequently present all the symptoms of, or in other words run into, typhus fever. So also typhus fever sometimes terminates in, or assumes the peculiar symptoms of bilious remittent or intermittent fever. Dr. Armstrong (*Practice*, page 431), recognizes precisely the facts of which I have been speaking. He says :

“ In some parts of the world the remittent form of fever is called typhus fever ; but in most places, the continued form of fever alone has that name applied to it. Typhus fever, as used by those who adhere to the nosological arrangements of Dr. Cullen, is an exceedingly vague term. Many persons adhere to a system founded upon words, not on things ; on symptoms, not on conditions ; and if you ask them for a real, and not a nominal, definition of typhus fever, they can not give you one.

“ But to speak the truth, we have nothing which approaches to a correct definition of typhus fever. That of Cullen is adopted and upheld by scholastic and collegiate authority, which almost always, lagging far behind the spirit of the age, sits in its monkish shroud, covered by the shade of ignorance, and starting like a guilty thing at the light that disturbs its repose.”

On page 435, Dr. Armstrong cites a case which finally led to a change in his views of the cause of typhus fever. The case cited is so perfectly coincident with my observations, and the deductions and remarks of Dr. Armstrong so nearly express my views, that I shall furnish you with another liberal extract :

“ Six years ago, and shortly after I had published the third edition of my work on typhus fever,* in which I had strenuously maintained the doctrine of human contagion, I met with a case of intermittent fever. In a few days the fever became remittent, and in a few days more it put on the continued character, and the patient died with all the most malignant symptoms of typhus fever.

* Dr. Armstrong occupies a very respectable position among the medical authorities, having been an eminent lecturer in a celebrated institution in London, and author of a work on typhus and scarlet fever.

"This case made a powerful impression on my mind, and I could not help asking myself whether it was not possible that the common ague of this country, the marsh remittent fever, and continued typhus fever, might be one and the same affection, modified by certain circumstances. I determined, at any rate, to reinvestigate the subject; for I suspected I might have taken up as a prejudice at college, the doctrine of contagion, and might have acted on that prejudice as a sacred truth. Few men have more contemptuous views of blackletter learning, and the dogmata of schools; yet the opinion clung to me closely, and I parted with it gradually; if not with regret. I investigated the subject afresh, resolved, if possible, to arrive at the plain truth, whatever it might be; and in six years the result has been that I am perfectly convinced that what is commonly called typhus fever, does arise from malaria or marsh effluvia; that it is intermittent, remittent and continued: that it arises from infection, and that it does not originate from human contagion. It should be remembered that infection is not contagion. It is a state of atmosphere produced by the surface of the earth and the air, which is limited to a certain space; and persons breathing it are subject to certain modifications of a similar disease.

"It is a very humiliating thing to the human mind to detect long established error; but it has these two advantages;—it gives a man the satisfaction of possessing the truth at last; and besides this reward, it makes him more cautious in the admission of prejudices for the future. Nothing can satisfy the human mind which contemplates the phenomena of nature around it, but the conviction of possessing the truth. The longer I have lived, and the nearer I have advanced step by step to the grave, the more I am convinced how small is the amount of that I know; and while I feel the most perfect humiliation that I know so little, I am bound to make the most public acknowledgment of the full extent of my ignorance. In fact, having discovered my error, the only reparation I can make, is by such an acknowledgment."

Under convictions produced upon my mind by personal observation of the nature and cause of disease, it has been my duty from time to time to make confessions similar to that just quoted from Dr. Armstrong. And although the errors of prejudice and education were, as he says, parted with "gradually, if not with regret," and although these confessions were humiliating to me as a man and as a physician, yet when truth, clearly ascertained has required

it, I believe I have always made the proper acknowledgment of my previous errors. And in addition to the personal advantages, derived from the change in my views, of which Dr. Armstrong speaks; "the satisfaction of possessing the truth at last," and the benefit of caution "in the admission of prejudices for the future," I have enjoyed and still enjoy the gratification of believing that this professional humiliation will result, in some degree, at least, in securing health and prolonged life to many of my fellow-beings.

Dr. Armstrong further says: "Sometime ago a family were brought into the Fever Hospital with typhus fever. The account they gave of themselves was, that an individual next door had fever, and that they visited him and caught the disease. Human testimony, however, is not always to be depended upon. The name of the family was Jay, and they lived in White Square, Clapham. The case of fever next door was one of scarlet fever, and had occurred four months previously. On further investigation of the cases of this family, I found that all but one originated in intermittent and remittent fever. Running round the whole of this square is an open common sewer; and if typhus fever occur in Clapham, it is sure to be in that square."

Upon precisely similar testimony to that above stated, in regard to the mode of contracting the disease by this family, are based many supposed facts, and facts too which are adduced to sustain theories and modes of practice. Let this impress upon your minds the infinite importance of care in your investigation of the history of any disease, before a final decision is made as to its cause or character.

Dr. Armstrong further says: "In one part of Norfolk there is a district, of which several thousand acres are sometimes covered by a continuous wave; and when the water subsides, leaving the slime exposed to the sun, then continued remittent and intermittent fevers occur very remarkably. In the period I have mentioned, since April, 1824, all these parts were under water; and while that was the case not a single instance of typhus fever occurred."

After thus illustrating and demonstrating, by the foregoing and many more examples, the malarial origin of typhus fever, Dr. Armstrong proceeds:

"I trust, then, that I have shown, that what we commonly call typhus fever originates from malaria—from an infection, and not from a contagion. The subject still involves another question of great importance, which is this: Does it, or does it not, become

contagious? Does it acquire the additional property of communicability? It requires to be proved, in short, whether diseases arising from infection can become contagious," etc.

"Now," continues Dr. A., "though I would not take upon me, till I have seen and reflected more, to say positively that typhus fever is not contagious, yet I doubt the correctness of the doctrine exceedingly. Nay, I would say that if typhus fever be ever communicable, it is an exception to the general rule—an anomaly in the course and common character of this affection—an occasional aberration from a general law of nature.

"I could mention many facts in proof that typhus fever is not communicable by contagion."

Among the cases recited by Dr. A. in support of his opinion of the non-contagious character of the disease, may be found the following:

"I attended," he says, "a gentleman who was dying of typhus fever when I saw him. His wife read my looks more distinctly than my language, and affectionately pressed her husband again and again to her lips. But though his teeth were crusted with dark sordes, though he had almost all the most malignant symptoms of typhus fever, and though his wife had been previously exhausted by night-watching as well as mental anxiety, yet she had no attack of typhus fever."

"I saw a child laboring under typhus fever, of which it was thought to be dying, although it afterward recovered; but though the father of this child kissed it again and again without any precaution, yet he had no attack of the typhus fever. I have known many instances of infants at the breast laboring under typhus fever, in which the mothers had no attack of that affection."

I desire to say in this connection, that I would not be understood as comprehending in this discussion the disease termed *typhoid fever* by modern authors; as I am entirely satisfied that the latter disease is distinct in its character, and produced by a different cause. And I will say also that while I agree in every particular with Dr. Armstrong, in regard to the identity of typhus fever, as generally described, with marsh malarial fever, yet I feel confident that many of the cases described by him were in reality typhoid fever; as the peculiarly characteristic symptoms of that disorder most clearly peer out in the history he has given of them; although the distinction between the two forms of disease was not recognized by that truly original man. The anatomical develop-

ments and diagnostic symptoms had not at that time, been so clearly pointed out by any author, as they are now; and practicing, as Dr. Armstrong did, in the midst of the two diseases, and often finding them to coëxist, it is not a matter of surprise that the distinctions which more extended investigations have shown to exist, were not detected by him. In fact it could scarcely have been expected of one mind, to accomplish more than he has done, in divesting such a subject of its errors and clearing away the rubbish by which it was obscured.

As we shall discuss the subject of typhoid fever at a future time, I will not now dwell upon it.

The question involving the contagious or non-contagious character of typhus fever, is indeed one of much importance in practice, and is replete with interest to the human family. If regarded as contagious by a community, its appearance strikes terror into most minds, and very often the sick are avoided and neglected by relatives and friends; and the consequence is much unnecessary suffering and misery; and not only so, but a very great increase in the mortality. Hence if you shall upon due investigation and reflection, be convinced as I have been that the doctrine of contagion as connected with this disease, is an error, you will of course see the importance of impressing the fact upon the minds of community. Here however, you will find great difficulty, for mankind cling with great tenacity to old prejudices and long cherished opinions, however false and pernicious; and having been taught to "believe in the contagious nature of typhus fever," in the language of Dr. Armstrong, "many would deem it criminal even to question that creed."

First however, examine this subject thoroughly—hear, read, and investigate, until you are confident you have the truth—and I believe you will be prepared to agree with Dr. Armstrong, that typhus fever is not communicated by contagion. Of the correctness of this opinion I have not a remaining doubt. That it is propagated by infection none will deny, but there is a great difference between infection and contagion.

I have seen a whole family suffering with typhus fever where none of the neighbors took it, although they were present much of the time. In fact I have not seen any evidence that this disease is ever contagious; I mean such evidence as rests upon well attested facts going to establish the doctrine—such evidence as that which fixes the character of contagion upon small-pox, measles,

or even scarlatina, though the last-mentioned disease is not as uniformly and certainly contagious as the other two. The general rule which applies to diseases which are unquestionably contagious is, that an individual who comes in contact or close proximity with one who has the disease, will contract it, let the atmosphere be ever so free from morbid influences, except those produced by the presence of the sick person. Where an unprotected person escapes after such exposure, the case is an exception to the general rule; but if typhus fever be contagious, the exceptions far outnumber the cases in which there is even the appearance of communication by contagion.

Another peculiarity of contagious diseases may be mentioned, which does not pertain to typhus fever; and that is, the fact that one attack generally protects the individual from a second. There are exceptions to this rule also in all diseases; but the system is never secure from future attacks of typhus fever, no matter how frequently it may have suffered from the disease.

From all that has been said, I feel safe in assuming the position which I have taken, namely, that typhus fever is not a contagious disease, distinct in cause and nature from our Western malarial fevers; but that it is only a modification of bilious or remittent fever, resulting from some peculiar condition of the system, constitutional predisposition, or from surrounding circumstances.

This congestive or typhus form or modification of remittent fever may usually be recognized by the appearance of the tongue and attendant symptoms, differing in some respects from those of ordinary bilious fever. In the most distinctly marked cases, you will find a dry, swollen, and crisped tongue after the disease is fully developed; a pungent heat of the body and an exceedingly dry, husky, and as it were parched feeling of the skin; a pulse full, bounding and tense, varying in frequency, in different cases to a very great extent; with all the usual symptoms of febrile action. The secretions are disturbed, respiration difficult, the patient probably unable to breathe at all through the nostrils, and the tongue so dry that it is impossible to protrude it from the mouth. But you will of course in this as in other affections, find much variety in the symptoms of different cases, and as has been remarked before, you must not expect me to give a description which shall embrace all the minutiae of every case. A general outline of the disease, with some of the particular symptoms that

prevail in most cases, is all that can be given, and I suppose all that you expect. If you exercise that thought and discrimination which should characterize the investigations of every physician, I am willing to trust to your sound judgment to determine the true nature of any case of this kind; and I have no fears that the views I have presented will fail to be verified and sustained by the conclusions at which you will arrive.

The appearance of the tongue to which I have referred, I regard as an indication of *congestion of the liver*. The edges may be exceedingly red, while the whole surface is dry and cracked, and perhaps bleeding and swelled. This appearance I say indicates engorgement, if not inflammation of the liver; and the engorged and swelled condition of the organ will often be manifest upon examination of the right side below the ribs. In severe cases there will be pain upon pressure in that region.

In the winter we often find these symptoms in connection with those which pertain to congestion of the lungs; and post-mortem examination in such cases proves that both the liver and lungs are involved. The pulmonary congestion may be known by the cough, bloody expectoration, and dark sputa, and by the sounds obtained by physical examination—percussion giving a dull, heavy sound, while auscultation detects the bronchial respiration. But as these symptoms will be more minutely detailed when we shall speak of inflammatory diseases of the chest, we let it suffice to have said thus much here, and pass to another point.

There is a peculiarly dull, sleepy expression of the countenance accompanying this congestive or typhus fever. Frequently both cheeks are red and swelled or bloated, giving a bright, glossy appearance to the skin; the eyes are suffused, and the patient is in a stupid, obtuse condition, free however, from structural disease of the brain, as is evident from the ease with which he may be aroused from the sleepy state.

Such is a brief outline of the distinguishing symptoms of congestive fever. I have not deemed it necessary to repeat the symptoms which characterize this as a periodic, malarial disease; so much has already been said on that subject, that you can not need any further description of those unmistakable peculiarities which distinguish this class of diseases. Indeed, the descriptive remarks I have just made are to a great extent, a repetition of what was said in connection with the modifications and complications presented by intermittent and remittent fever; the principal difference

being that, in the modification we are now considering, these attendant difficulties are more embarrassing, the symptoms more unyielding, and the depressing force of the morbid influences much more intense. It may also be remarked, that these collateral affections, and especially that of nervous depression, appear earlier in congestive than in remittent fever; and the tendency to continuous febrile action is rather more prominent; yet in every case there will be discoverable the rise and fall of the fever, corresponding perfectly with the regular periodical paroxysms of simple malarial fever.

As is the case in remittent fever, so in the disease we are now considering, there is a tendency unless the disease be arrested to degenerate into a low form of *nervous continued fever*. It was stated in regard to bilious fever, that harsh treatment, as drastic purging and active depletion, was very likely to bring on this asthenic condition. The same is peculiarly true in the present instance, and even without any such cause the fever in this case, with its subsidiary local affections, is very likely to bring on a general state of enervation, characterized by the low, weak, stupid condition which has given the name *typhus* to this modification of fever.

Proper treatment early in the disease, by which the paroxysms shall be arrested, while the strength and vitality of the system are preserved, will generally remove the whole disease together, or at least reduce it to the form of an uncomplicated local disorder, easily controlled by proper treatment.

Sometimes however, this is not the case. Owing to the overpowering force of the morbid cause, or to a peculiar susceptibility in the patient, the enervation persists, even after the paroxysms have been promptly arrested, and all apparent local engorgements relieved, or appropriately treated at least. This condition I shall now attempt briefly to describe.

The skin in this congestive form of the disease is dry, generally cool, with occasional flashes of heat. Sometimes however, there is for some time a persistent, pungent heat of the surface, but followed finally by a cold, clammy condition, indicating great deficiency in the capillary circulation. The extremities are generally cool, sometimes cold. The pulse is frequent, with very little force, although it has a wiry, resisting character; and as the disease continues, the pulse increases in frequency while it diminishes in force. The tongue is usually brown and more or less dry, especi-

ally in the middle; or it may be clean, smooth and glossy, assuming an appearance similar to raw beef. Sometimes it becomes dry, contracted, curled up as it were, and very tremulous. The teeth in many cases become covered with dark sordes, which even extends over the gums and lips. The stomach and bowels are generally irritated, causing often an intolerance of the slightest nourishment, and not unfrequently there is diarrhea. The evacuations may be light-colored, though they are generally dark and very offensive, especially where procured by medicine. The abdomen is generally flat or even concave, and often very sensitive to pressure. The urine is hot, scanty, and often very highly colored. The nervous system early becomes deranged in this disease, and the characteristic symptoms of nervous disorder are more and more developed as the disease progresses. There is often headache, either constant or occasional; a slight wandering of the intellect, especially on waking; the organs of sense are blunted; the muscles are observed to twitch involuntarily; and the patient is uneasy and restless, or otherwise inclines to stupor attended with an oppressed respiration. These nervous symptoms become more and more marked, as before stated, and then we find the patient in a state of coma perhaps, or if not, there is low muttering delirium with *subsultus tendinum*, and a constant picking and reaching with the hands.

The treatment of congestive fever is now to be considered, and as this disease is but a modification of malarial remittent fever, you will of course expect the treatment to be similar to that directed for the latter. Treatment is the paramount subject connected with the discussion of every disease, it being the principal object for which investigations and researches in the science of medicine are commenced and prosecuted. Every other topic should therefore be considered by the medical student as secondary in consequence to a scientific, rational, and successful method of treating disease; and other subjects should rank as important, in exact proportion as they prepare him for successful practice in the healing art. To the student who studies for the sake of science merely, whose object is solely to store his mind with knowledge, with no purpose of becoming a practitioner, the remark just made may not perhaps apply; but where the individual proposes to take human health and life into his charge, nothing surely will be of so much consequence as a thorough, practical qualification for his high responsibility. Therefore while I would have you always on

the alert, let the topic of discussion be what it may — for every thing connected with your profession is highly important—I would claim your special attention when the subject of treatment is on the tapis.

In prescribing for this affection, as in the case of remittent fever, the first indication is the removal of the malarial influence, which is to be accomplished by the exhibition of the antiperiodic remedies. Here also, I disregard all complications in reference to the administration of these medicines. Being fully satisfied of the presence of malarial influence in the system, I come in at once with the proper means for its elimination, notwithstanding the existence of congestion or inflammation; though if deemed necessary, I combine with the antiperiodic remedies such measures as will tend to relieve the local engorgement. You may think it dangerous, gentlemen, to administer the quinia and iron where there is congestion; and I have seen the time when I should have regarded it as an act of madness; but I must credit my own senses; and a long course of observation and experience in the management of this grave form of disease has convinced me of my former error, and of the entire safety and utility of my present mode of treatment. I have never seen a case of congestion aggravated in the least by the use of these remedies, although given in almost innumerable cases where the symptoms of that condition were unequivocal, and without premising any treatment for their removal. As before remarked, I often combine with the antiperiodic, other remedies, with a view to reach and remedy the local affection, but I never delay the quinine and iron to allow time for depletion or evacuation, or any other preliminary measures.

Where the stomach is loaded I administer an emetic, provided I can do so without interfering with the administration of the antiperiodic remedies during the first remission. This measure, under such circumstances, relieves the stomach of accumulations, equalizes the circulation, and secures for the next medicine a more perfect influence in the system. And here very much depends upon the choice of an emetic agent. If you give one that tends to produce local inflammation, you will always aggravate the case; but if you employ an agent that is quick in its action, and that tends to determine the circulation to the surface, and equalize it throughout the system, you will accomplish an important desideratum. The best emetic that I am acquainted with, for such a purpose, is an infusion of *Eupatorium perfoliatum* (boneset) and *Lobelia inflata*;

half an ounce of each to a pint of water; given in doses of a tablespoonful every ten minutes. Or the acetous tincture of *sanguinaria* and *lobelia*, in tablespoonful doses, every ten or fifteen minutes, is a very excellent emetic. In giving either of these prescriptions, direct the patient to drink freely of boneset tea, and continue to repeat the dose as prescribed until free emesis is produced. It is as important for you to know how to give an emetic, as it is to know what to give. If the first dose come up immediately, give another, and repeat it until you completely evacuate the stomach. After the first dose, the stomach gradually becomes accustomed to the medicine, and you may have to give several doses before vomiting will be produced to the extent desired; but I repeat, persevere until the stomach is emptied.

There is no danger in administering either of the preparations I have mentioned, to the extent of producing three or four active evacuations; and where the indication exists and time will permit, I would not fail to employ this measure. Still I would lose no time for that purpose; but should give the sulphate of quinia and prussiate of iron, three grains of each for a dose, every two hours during the very first remission. If first called to a case at the decline of an exacerbation, and I found the stomach loaded, I should promptly give the emetic, but if the remission was being lost, I should defer the emetic until the decline of the next hot stage, which I should shorten by its administration. Indeed it sometimes happens that the fever yields at once, and disappears without a subsequent exacerbation, under the influence of the quinia and iron, leaving you ample time to remove accumulation, relieve congestion, or meet any other special indication. Generally however, the first remission is too slight and too short to allow your medicine to establish its influence in the system, and the fever will rise again. In that case soothe and palliate the febrile excitement until the fever begins to decline; then give the emetic, if indicated, and follow at once with the antiperiodic powders. You will now most certainly have a palpable and protracted remission, if not a complete apyrexia; and this will afford time for the administration of so much of the antiperiodic remedies, as very probably to dismiss the fever entirely. If not, proceed as before until the paroxysms are arrested. The emetic however, will not need to be repeated if thoroughly employed at first.

The palliative measures for the hot stage will of course be entirely similar to those recommended in remittent fever. Bathe the

patient in warm water, to which you may add a little alkali, and also whisky or alcohol. To relieve pain and allay nervous irritation a gentle anodyne may sometimes be proper, where the brain is not affected, as the comp. tinc. serp., or comp. powd. ipecac. and opium; though generally it is preferable to avoid opiates. The bathing, and where the stomach and bowels are distressed, fomentations or cataplasms to the epigastrium and abdomen, will generally be sufficient. If the patient is anxious to be medicated, as is often the case at such times, a harmless *placebo* will meet this indication.

Thus far the treatment you perceive is substantially the same as that suggested for remittent fever. Both diseases being produced by the same cause, and marked to a great extent by the same features, the one being indeed but a modification of the other, they must of course be amenable to the same remedies, so far as regards radical treatment. For in both cases malarial fever is *the* disease, the arrest of which is the first indication, and you are now I believe pretty thoroughly instructed in the mode of accomplishing this important object. Bear in mind that no condition of the system, or any of its organs, contraïndicates the use of the antiperiodic measures; the only question being here, as in bilious fever one of expediency, or rather of choice, as between the exacerbation and remission, for the exhibition of these measures. Still this form of disease very often presents difficulties of no trifling character, in the form of local organic and complicated disorders and engorgement, which must receive special attention.

Gastro-intestinal irritation, or even inflammation, is not an uncommon accompaniment to this fever. Especially is this condition apt to supervene where the patient has been actively purged in the beginning, whether by himself or a physician. Hence it is that I so studiously eschew cathartics previous to arresting the paroxysmal fever. Where the bowels are somewhat irritated, a cathartic is certain to aggravate the irritation, and where no symptoms of this condition are present, they very generally make their appearance after an active purge. But where the alimentary track has not been disturbed by such means, I have often seen very serious symptoms of such irritation subside with the arrest of the periodic fever. This may seem strange to you, but it is no more strange than true.

This gastro-intestinal disorder is the most difficult complication incident to this fever. Very little reflection will convince you of this; for in this affection the very surface to which you must apply

your remedies for the relief of the system, is so far diseased as to tolerate with difficulty your medicines, and when they are retained, they are not likely to act upon the system with the promptitude and certainty which might be expected were the stomach and bowels unaffected. Hence the importance of managing such cases with the utmost care and gentleness. Avoid all harsh and irritating internal measures. It may even be necessary in some cases, to omit the prussiate of iron in the antiperiodic powders, and give the quinia alone, as the iron sometimes increases gastric irritation in cases of great sensibility: no such danger however, need be apprehended from the use of quinia. After the fever is arrested, if this condition of the intestines continue, the same course of mild treatment must be pursued as recommended for this complication with bilious fever. The bread and milk cataplasm to the abdomen, sinapisms to the extremities, and bathing the whole surface are indispensable external measures; while internally, the patient should take mucilaginous drinks, and such light diet as rice or barley water. Emollient sheathing injections will be of much service, to which may be added laudanum in case there is diarrhea; or if opium be contraïndicated, some astringent may be substituted, as tannin, infusion of galls, geranin, etc.

Torpor of the liver will be denoted by the symptoms usually attendant on that condition. Yellowness of the eyes and skin, the presence of biliary matter in the urine, and its deficiency in the alvine evacuations are the leading symptoms of hepatic torpor. These symptoms are not to be overlooked, nor slightly regarded. You should see and examine the patient for yourself, and not trust to the nurse or other person for even a description of the discharges, but examine them also for yourself. You will often be told that the stools are yellow when there is no bile in them, that they are "very dark and bad," when they are good bilious discharges; an ordinary loose evacuation will be described as watery or *vice versa*. In fact I should hesitate to prescribe upon the observation and description of a *physician*, unless I knew that he had a more full appreciation of the importance of such examinations, and was accustomed to more minute and correct investigation in such cases, than are the majority of practitioners.

The condition of the liver is of great importance in the treatment of this disease, and every symptom pointing to that organ should be carefully observed. The condition of the alimentary canal must also be considered, in connection with that of the liver,

when you come to make your prescription for the case; for no matter how torpid or how much engorged or inflamed the liver may be, it must not be relieved at the expense of aggravated irritation of the stomach and bowels. Where gastro-intestinal irritation coëxists with hepatic disorder, the medicines designed to act on the liver, or any other glandular organ, if given at all, must be administered in very small doses, cautiously repeated. Thus you may avoid an increase of intestinal irritation, while the system, under such circumstances, will respond even better to these gentle, kind calls, than to more harsh and peremptory measures.

The emetic in the commencement, as mentioned while speaking of the treatment for arresting the paroxysms, will do much toward relieving the liver if so early involved, and also to prevent subsequent disorder of that organ. The combination of podophyllin and leptandrin with the quinia and iron may often be of much service, having at the same time due reference to the state of the stomach and bowels, in fixing the dose. But this part of the subject was sufficiently elucidated in the treatment given for bilious fever and its complications. The directions there given will fully apply to the present case, previous to the arrest of the malarial fever. See page 346.

After the paroxysms have been interrupted, the symptoms of torpor, and perhaps congestion of the liver, frequently remain. Here then you have a local disease to treat, unattended by the embarrassing influence of daily exacerbations, and an affection toward the cure of which you will now direct your efforts. Where there was nothing in the condition of the stomach and bowels to prevent, I have given large doses of podophyllum, for the purpose of producing its emeto-cathartic action, and I have seen grave cases promptly relieved in this way. But occasionally the medicine did not act as an emetic, and then it rather aggravated than relieved the case. I have sometimes repeated it with the addition of ipecacuanha, but I can not recommend this as the best course. The use of podophyllin and leptandrin in the proportion of one part of the former to two of the latter, given in powder, or, which is better, in pill, by combining them with extract of taraxacum, in small doses, repeated so as to act on the liver without directly disturbing the bowels, is both safe and reliable. The liver will respond to the alterative action of these remedies, when thus given, with more readiness than to that of calomel, especially where there is intestinal irritation.

Very frequently the torpor of the liver is the result of gastro-intestinal irritation, as was stated once before, and the soothing, mild treatment proper to be employed, and which has been recommended in that case, is often all that is required. The hepatic torpor being dependent on the irritated state of the bowels, that organ resumes its function as soon as the intestinal disorder is relieved. But if the liver remain inactive after the bowels have been in some measure restored to health, then the podophyllin, leptandrin, and taraxacum are the remedies to be relied on, administered as above directed.

When there is much congestion or inflammation of the liver, and this persists after the paroxysms have ceased, the chief reliance, beyond a proper regulation of the bowels, must be on external applications, such as cupping over the location of the liver, followed by hot fomentations; sinapisms to the extremities; and the other usual means of equalizing the circulation.

If, notwithstanding the arrest of the periodical fever, and the use of proper remedies for persistent local determination or inflammation, the case should run on into a low form of fever, known generally as congestive or typhus fever, your professional skill is very likely to find a severe test. Your calling now will not be so much that of a prescribing *physician* as an attendant *guardian*, to watch the condition of the patient, and prevent harm from being done by medication. Your only course now is to soothe, encourage, and in some measure sustain your patient, waiting for the recuperative powers of the system to react. The lingering fever should be allayed by the warm alkaline bath, the bowels soothed by emollient injections, so medicated as to keep them in a quiet, soluble condition, and the soothing application of the bread and milk cataplasm, as before directed.

But under such treatment many cases will gradually yield, the symptoms softening down, and the powers of the system being restored in a short time. Others will linger in this typhoid condition for many days, perhaps weeks, and finally recover by very slow degrees. Harshness in such cases will not do; and although you have removed the primary disease, and to a great extent all the active local disorders resulting from it, you may still lose your patient by want of care in this respect. A single drastic dose of medicine, whether given under or in opposition to your advice, may decide the case fatally. Continue the bathing and injections, and as it may satisfy the patient or the friends to give medicine by

the mouth, let the patient take occasionally a weak solution of carbonate of ammonia; this will soothe the stomach and afford all the stimulation which the case will bear, and serve at the same time as a satisfying *placebo*.

Let the diet be very mild and bland, especially during the early part of this stage of the disease. Rice, barley, or bread water, or tea poured over toasted bread or crackers, will be as strong diet as should be allowed. Should the case be protracted, however, for ten, or fifteen, or more days, more substantial food must be given. A healthy man can not live much beyond twenty days without food, much less one whose vitality is extensively reduced by disease. I have no doubt that these low fevers have been protracted for want of nutriment.

After the skin becomes cool and the febrile action ceases, stimulants are often required to enable the system to react with sufficient energy to commence the process of repair. I have been accustomed, in this condition, to direct the use of ale diluted with water, in such quantity as the case seemed to require. I prefer this to brandy or wine, as it is less stimulant, and more soothing, nutritious, and tonic. Another gentle tonic and one which I can not too highly recommend in these cases, is a decoction of the bark of *ptelea trifoliata*. This is a pure, unirritating tonic, that will not aggravate any morbid symptoms which may remain, but will give strength and tone to the system. The decoction may be given cold, in doses of a tablespoonful once in two or three hours. See page 357.

[The editor of this work is convinced that there is a disease essentially different from both marsh malarial and typhoid or enteric fever, to which the name *typhus* is appropriately applied. A description of it may be found in the second volume under the head of contagious diseases. He has, however, thought it due to the profession to retain for the present Prof. J's. arrangement and give his views in full in his own language.]

LECTURE X.

MALARIAL FEVERS—CONTINUED.

Pernicious Fever: More Common at the South; Characteristic Symptoms; Condition of the Bowels; Blood; Diagnosis and Prognosis; Prof. Wood's opinions; Treatment; Two indications, produce reaction and prevent subsequent paroxysm; Concluding Remarks—Prof. Bell's cases and Treatment—Remarks.

PERNICIOUS FEVER.

We have not yet done with remittent fever and its modifications. It may be asked why we describe so many modifications of this disease, if it is always essentially dependent on the same cause? I answer, that the same cause operating under different circumstances or in different constitutions, must necessarily produce different symptoms. If all human constitutions were precisely alike, and always subject to exactly similar influences, none of those varieties and complications which are so perplexing to the practitioner, and which now engross so much of our time, would be encountered. The course of a disease in one individual would then be a correct type of the same disease, whenever or wherever found. But we must take facts as they exist, and since we know that even in the same individual, a disease presents at one time a very different train of phenomena from those exhibited at another time, and under other circumstances; since more especially, different persons similarly situated in every respect, present such variant symptoms under disease evidently induced by the same cause; and since these diversities and modifications are so likely to mislead and embarrass the inexperienced practitioner, I deem it of the utmost importance to dwell at some length upon this part of the subject. I desire if possible, to prepare you to anticipate and meet successfully, those changes, modifications and complications which you are sure to encounter at times in the treatment of malarial fevers. Hence I endeavor, even at the risk of being thought

tedious, to describe to you the bold, prominent, I might say singular characteristics of each modification, leaving the minor and less important shades of difference to your own observation and discrimination.

The next modification of malarial fever to which I call your attention is what the authorities, especially the recent ones, call **PERNICIOUS FEVER, or PERNICIOUS DISEASE.**

This form of the disease occurs more frequently at the South than in this part of the country. It is occasionally met with in the Middle States, but it is not so frequent nor so malignant in its character as in the more Southern regions. I have myself met with a number of cases of this kind, and should not do justice to the subject nor to you, if I failed to present the symptoms observed and the treatment pursued in those cases.

There is no question in my mind that this is primarily and essentially a disease of the nervous system. There is an enervated, I might say, almost paralyzed condition of the vital functions, attended by all the symptoms which we would expect to find under such circumstances.

The *characteristic symptoms* are, coldness of the extremities, which often extends over the whole surface; in other cases the skin on the body has a hot, pungent feel, while the hands, feet and face are cold and really death-like. There is a peculiar shrunken, livid appearance of the skin on the face and extremities. The features have an expression of apprehension or alarm, even when no such emotion is present, and the hands and feet look shriveled, and the skin is corrugated, resembling the hands of a washer-woman when they have been long soaked in soap-suds. The tongue is usually white or pale; in some cases dry, with a peculiar pale and shrunken appearance; in others it is moist, and perhaps little changed from the normal condition. Sometimes the paralyzed condition of the nervous system disables the patient from protruding the tongue, and you have to press down the chin to see it. This, however, is not generally the case: in most instances the patient is able to talk and you can obtain a history of his case from his own lips. In other cases there is stupor, approaching a comatose condition,—the patient being aroused with difficulty, if at all, during the height of the paroxysm.

The pulse is usually very small, irregular and sometimes fluttering: it may be hard and corded, but most generally it has very little force, being easily arrested under the finger. In some cases

it is intermittent; in others, extinct at the wrist. When exceedingly rapid—120 to 160 a minute—it shows a serious and formidable attack.

The stomach is in some instances very much disturbed, as evinced by continual retching and vomiting, and this is one of the most troublesome symptoms with which you will have to contend. The evacuations from the stomach are rarely bilious, but generally consist of what has been taken into the stomach mixed with frothy mucus, tinged in some cases by streaks of blood.

The condition of the bowels also varies in different cases. In some the evacuations are almost incessant, in others there is obstinate constipation. The character of the evacuations too, differs essentially in different cases. These are sometimes of a watery, choleric nature; in other cases they have the appearance of bloody serum, resembling water in which flesh has been washed.

The thirst is exceedingly great, but water is rejected almost as soon as swallowed.

The *respiration*, among other functions, is seriously embarrassed. In some cases it is hurried, frequent and panting; while in others it is irregular and sighing. This last may be regarded as a very urgent symptom, denoting a grave grade of disease and foreboding a fatal result if allowed to continue long.

Extreme restlessness is a symptom almost constantly present in this modification of the disease,—more so perhaps than in any other form of bilious fever. The patient is incessantly tossing about, and tumbling from side to side.

The symptoms just described present the essential character of malarial disease. In fact in the incipient stage, and frequently during the early exacerbations, it is not to be distinguished from a violent attack of intermittent or remittent fever. But whether the *pernicious symptoms* appear at once, or are more gradually developed, they are nevertheless subject to the laws of periodicity. The type may be quotidian or tertian, possibly quartan, or double quotidian. The paroxysm having reached its height continues for a longer or shorter time, and then the symptoms gradually subside, the system rallies and a reaction more or less perfect is established. The patient is now comparatively comfortable,—sometimes indeed appearing in an almost healthy condition. But when the period of the disease returns the same train of phenomena reappears, generally aggravated in intensity, to be followed, if the patient survive, by a remission less perfect than the preceding; and thus will

the case progress by regular periods and increasing malignancy, until arrested by remedial measures, or the patient sinks under the disease.

The bloody serum which I have said escapes from the intestines in some cases of this kind, is not a secretion of the mucous membrane, but is the result of a kind of *exosmosis* or transudation through the enervated and relaxed tissues of the mucous surfaces. It is altogether similar to the percolation through the tissues that takes place after death, and by experiment on the membranes out of the body, it is clearly ascertained to be the result of a softened condition of the tissues. Nor is this the only disorganization to be apprehended. The blood is often partially decomposed; the liver and spleen either engorged with blood, or softened and partially disorganized. There is seldom any structural lesion of the thoracic viscera, but the brain and spinal cord with their membranes, give evidence that the disease has spent its chief violence on these central organs of the nervous system. The membranes are injected, the brain increased in density, and the cortical portion especially, deepened in color, while there is usually an effusion of serum in the ventricles.

For the purpose of forming a *diagnosis* in this modification of bilious fever, the leading symptoms already described are sufficient. The *prognosis* must, of course, regard the case as formidable and fraught with danger,—almost certain to prove fatal unless promptly relieved. The only question of importance then for the practitioner is, whether the patient will live through the present paroxysm, or will probably sink under it. The chances of success are much increased if you can secure an intermission, or even remission in which to administer your remedies. If from the history of the case and the present symptoms, you are confident a remission will follow, you have reason to hope that prompt measures may prevent, or at least weaken a subsequent exacerbation. But if there is reason to fear from the progress of the disease, the gravity of the symptoms, and exhaustion of the patient, that the present paroxysm is likely to prove fatal, no time should be lost before the employment of radical measures. Where there is doubt as to the character of the attack—as, where you can not learn its history, the number and duration of previous paroxysms and remissions, the medicine already administered, etc., it is best to resolve such doubt in favor of immediate action. One of the most urgent cases I ever saw, was one in which I feared to wait for a

remission. There was a very general suspension of nervous sensibility, yet the antiperiodic medicines were administered under these circumstances with the most happy results. And as I have said in a former lecture, there is good reason to question the propriety of losing a moment in any case, under the idea that these medicines may not be administered with propriety during any stage of the disease. Deference to custom, the impression that it is more agreeable to the patient and his friends to give the medicines during a remission, and that a less dose will then suffice, have induced me to prefer that stage for the exhibition of antiperiodic remedies; but it is a mere question of expediency and convenience, which should have no influence in an urgent case.

Formerly, under the delusion that congestive fever, as this malady was then called, depended upon inflammation, it was the practice of many physicians to bleed; but the fatal tendency of such practice, if it did not convince them of the fallacy of their theory, soon drove them to the employment of very different measures. And now, although you find most of the recent authorities still insisting on the necessity of an intermission before the administration of quinia, yet you will perceive that they do not require you to remove local lesions previous to its exhibition. I am gratified however, to find my views and experience in this disease substantially corroborated by Prof. Wood, of Philadelphia. In his "Practice," Vol. I., page 293, speaking of the treatment of "Pernicious Fever," he says:

"Sulphate of quinia may be advantageously employed, even in the paroxysm, before reaction. It is indicated for its excitant influence upon the nervous centers, and is all important in reference to the next paroxysm. It may be given in any prostrate case, in which it can be borne by the stomach." Here no hesitancy or delay, to "prepare the system," is advised, no inquiry as to local congestion or inflammation is suggested, although the anatomical characters of the disease, given by Professor Wood, certainly indicate that the brain and spinal cord always, and the stomach, bowels, liver, and spleen frequently, are so involved as to produce "injection" of the arachnoid, pia mater, and substance of the brain, "effusion" in the ventricles, "softening" of mucous membranes, liver and spleen, etc. If lesions, producing such changes as these in the vital organs, so frequently accompany this "pernicious" disease, and yet are not worthy a thought in determining the propriety of giving quinia, why in the name of science and

of common sense, let me ask, should such caution be enforced when the case is an ordinary attack of bilious fever? Verily, "consistency is a jewel."

The *treatment* will of course consist of measures adapted to fulfill two indications. First, to produce a reaction; secondly, to prevent a subsequent paroxysm. As you are already informed, in view of what has just been said, means to effect both these objects may be simultaneously employed. There is no necessity for, and very little propriety in delaying antiperiodic medicines, if they can possibly be introduced into the system. They must not be delayed in an urgent case.

For the purpose of resolving the paroxysm, or hastening the reaction, various means have been found useful.

Stimulant applications to the extremities, and indeed to the whole surface; rubbing the skin dry with pulverized cayenne pepper, followed by the application of cold water, applied with a sponge or towel, is a powerful stimulant measure. It may to some appear paradoxical, perhaps ridiculous, but I assure you I have seen more prompt and vigorous reaction produced by this means than any other application I ever used. The capsicum should be applied with brisk friction for some time, and then the cold water applied so long as to thoroughly moisten the surface. This gives a pungency to the pepper not attainable in other modes, while the stimulating influence of cold water arouses the capillary action, which is sustained and increased by the capsicum, producing redness and warmth of the surface, and thus doing much to afford present relief. The sinapism has also been employed with advantage. This, when applied to the whole length of the spinal column is decidedly efficient. And when we consider that the nervous center is the principal seat of lesion, a powerful revulsive application, such as this, immediately over the spinal cord, is surely a hopeful measure. I have found special advantage from a similar measure in a case of extreme prostration from cholera, accompanied with hiccough—a symptom very common in these serious forms of bilious fever. The affection was so distressing and prostrating as to threaten the life of my patient, and it obstinately persisted for forty-eight hours, in spite of all the means directed by authors or ordinarily employed. At length, after reflecting upon the nature and probable cause of the symptom, I applied a blister over the spine of the neck and back and as soon as this drew, the hiccough ceased and did not return. So in this disease, which much

resembles cholera in being a disease of the nervous system, and in its symptomatic manifestations also, we might expect great advantage from vigorous counter-irritation over the location of the spinal and organic nervous-centers; and my experience has in many cases verified its efficiency. It is a remedy that should in no case of the kind be neglected. I have known paroxysms of intermittent fever prevented by the application of sinapisms to the whole spinal column.

Where nausea and vomiting are present, or where there is a great sense of prostration and weight in the epigastrium, a large sinapism should be applied over that region. If there is *tormina* or intestinal irritation, the mustard should be extended over the abdomen. This, when no longer tolerated, should be followed by hot fomentations, such as bags of hops wrung out of hot water, or vinegar and water.

Where there is a rapid diarrhea, of a sero-sanguineous character, a pill of opium 2 grs., nitrate of silver $\frac{1}{4}$ gr., may be given. The nitrate of silver should be perfectly enveloped in the opium. This should if necessary, be followed by pills of pulverized nitrate of silver and gum arabic, one pill every three hours. Mucilaginous drinks are important also in this state of the case.

In the case of dysenteric symptoms, which are sometimes present, an injection of starch and laudanum should follow every discharge. Or instead of these, a pill may be employed as a suppository, consisting of opium 4 gr., nitrate of silver $\frac{1}{2}$ gr., repeated as often as it comes away. A decoction of marsh rosemary (*statice limonium*), or of *geranium maculatum*, will be of much advantage in these cases where the bowels are so much relaxed. The dose of the decoction of either may be, say four drachms every hour. These, with the hot bath, bottles of hot water or hot bricks placed near the limbs, stimulating liniments, and other kindred measures, are the means to fulfill the first indication.

Simultaneous with the above treatment, and as I believe corroborative of it, let the sulphate of quinia be given in doses of three to five grains, repeated every two hours. If thrown up from the stomach, follow immediately by another dose. The frequency and size of the doses will depend upon the urgency of the symptoms and the type of the disease. Where the type is quotidian, with alarming symptoms during the exacerbation, and the remission short, the quinia should be introduced into the system as rapidly as possible, by the mouth or by clyster. In more moderate cases,

where the remission will probably last some hours, and especially where the tertian type has been developed, more leisure may be allowed in the use of the quinia.

If the mucous membrane of the stomach and bowels does not appear to be much affected, the free use of quinia dissolved in spirit is of great advantage in arousing nervous sensibility and establishing reaction. I remember a case of this kind, where the patient had cold extremities, was entirely insensible, and breathed in a labored, stertorous manner. The skin was shriveled and corrugated, yet there was no diarrhea nor perspiration. I gave forty grains of quinia in a pint of whisky in twelve hours. The next day the patient was free from fever and had not another paroxysm. When reaction comes on, the spirit should be omitted and the quinia continued. In all cases, and in whatsoever mode administered, the specific constitutional influence of the sulphate of quinia should be attained before it is discontinued.

I can not refrain from giving here another extract from Professor Wood, which so nearly agrees with my views and the practice I have pursued with success for years, that I give it to you, though it may appear like a repetition, to some extent, of what I have just said. It is truly gratifying to find among the rubbish of authorities an occasional gem of truth, which shines all the brighter by reason of its crude and rusty surroundings.

Wood's Practice, Vol. I., page 295 — article, "Pernicious Fever:"

"As soon as a remission or intermission has been obtained, there is but one course of treatment, and that is all important. There should be no delay for previous treatment; no waiting for a more perfect relief from this, that or the other symptom. Such dallying has been but too often fatal. No matter whether the patient has been under treatment during the paroxysm or not; no matter how partial the remission, provided it be a remission; no matter at what period of the interval the practitioner may have been called; his first, his last, almost his only thought, should be sulphate of quinia. This is the remedy for the disease, and only this. At least, none other approaches to it in efficacy; sulphate of quinia being considered merely as the representative of the virtues of Peruvian bark. From thirty to sixty grains of this salt should be given, from the commencement of one paroxysm to that of the next. If none has been given or retained during the paroxysm, the whole should be administered in the remission or intermission.

The dose must be regulated by circumstances. When the disease is quotidian, with a short apyrexia, the doses must be large; when tertian, they may be smaller. They should be administered so that the whole quantity may be got down two or three hours before the time for the recurrence of the next paroxysm. From two grains up to half the amount necessary for the whole interval may be given at once. Nothing should deter from the administration of this remedy. Even excessive irritability of stomach is no sufficient contra-indication. If the quinia be rejected alone, it should be combined with opium or morphia; if still rejected, it should nevertheless be administered, in the hope that a portion, at least, may be retained; and recourse should be had to enemata, and to the endermic application. If administered by injection, it should be mixed with laudanum or morphia, and should be given in double or triple the quantity that might be necessary by the mouth. If applied externally, a large blistered surface should be made over the epigastrium, and the salt applied, very much diluted, in order to prevent inflammation, and consequent interference with absorption.

“The paroxysm is thus almost always prevented; or, if not, is rendered much lighter than it would otherwise have been. But the sulphate of quinia should be continued, in quotidian cases, without abatement, unless in consideration of its effects upon the head, until the period for the second paroxysm is passed. The disease is then subdued; or, at least, all of it which belongs to pernicious fever. The remaining treatment, if any is requisite, must be conducted as in ordinary cases.”

I need only add, that should no remission be perceptible at the time you expect one, still give the quinia. If you have been waiting for a remission, wait no longer, but give the antiperiodic medicine at once, in large doses, and continue it to the extent of producing its specific cerebral symptoms.

Recovery in these cases is generally rapid, though sometimes slow and gradual. The treatment during convalescence, will consist in the judicious use of tonics, baths, nourishing food, moderate exercise in the open air, and such means generally, as have been mentioned while describing the treatment during convalescence from other forms of malarial fever. Where much gastro-intestinal irritation exists, the patient may be left in that debilitated, precarious condition, described as sometimes following congestive fever, and I repeat the caution then offered against


harsh or careless treatment. The most watchful and at the same time the most gentle exercise of medical treatment, is imperiously demanded in such cases.

Such gentlemen, is the course of treatment upon which I have for years relied, for the cure of this formidable modification of malarial disease. A course, based not upon abstract theory or hear-say evidence, but upon my own personal experience and observations at the bed-side. And although the authorities lay down the prognosis of this disease as "exceedingly unfavorable," and their statistics sustain that opinion, you may be surprised when I assert, what is nevertheless true, that since adopting the treatment I have described, I have treated a large number of cases without losing one. I may not have seen the disease in the malignant form so common in the South, yet many of my cases came fully up to the descriptions of the books, in the urgency of their symptoms; they were precisely such cases as the adherents of the old system were and are accustomed to lose, and yet I have been uniformly successful. I therefore recommend to you with the utmost confidence, the foregoing mode of treatment.

In closing up what I have to say upon the subject of malarial fever and its modifications, permit me to make a few additional remarks.

You will please observe that my mode of treatment in all these cases is characterized by a studious avoidance of a harsh, irritating or debilitating course of preparatory medication. And I once more admonish you, as you value the lives of your patients, or your own reputation as physicians, to avoid the lancet entirely, to employ cathartics and emetics with much caution, in cases where there are accumulations, and then not as leading means of cure, but merely as correlative measures, which must not be permitted to retard the exhibition of the antiperiodic medicines.

In the next place, let me reiterate that no peculiarity, modification or complication, should make you hesitate in the use of those specific remedies which are alone to be relied upon to effect a cure. If I am correct in the opinion which I honestly entertain, that my practice in the various forms of this disease has been much more successful than that of the old school of medicine, it is owing I apprehend mainly, first, to my rejection of depletion, and my caution in regard to irritating and exhausting treatment, and secondly, to my repudiation of the doctrine that quinia is contra-indicated by symptoms of congestion, irritation or inflammation, whether general or local.



Finally, I remark as I did on a former occasion, that after all, the main superiority of this mode of practice does not consist merely in the fact that nearly every case of malarial disease is cured by it; but the chief excellence of this truly Eclectic treatment is seen in the rapidity with which the patients recover, and the soundness and vigor of constitution which they enjoy. A majority of cases survive the most vicious forms of old school medication; many of them however, with disfigured features, distorted frames, or constitutions irreparably shattered by the medical ordeal. A much larger majority recover where the cure is trusted to the power of nature, with perhaps a little judicious regulation as to diet and exposure, while confidence is inspired by *placebo* prescriptions, as shown by the statistics of Homeopathy; but in this way much time is lost in most cases, before the disease has run its course and worn itself out, and a long period of convalescence must supervene before the patient regains his vigor. While under the treatment I have described, the bill of mortality amounts to almost nothing, and the cures are generally speedy and thorough, neither disease nor treatment being permitted to leave a mark upon the constitution.

I will close the present lecture by producing an extract from the lecture of Prof. Bell on "Congestive Fever," as found in his edition of Stokes' Practice, pages 617 and 618. This extract goes to illustrate, by the cases cited, the position I have taken, that malarial fever will generally terminate in health, if allowed to run its course. In connection with these cases you will observe too, a remarkable and very proper confession of the injurious character of the so-called "regular" practice. Prof. Bell says:

"I refer now to the spontaneous termination of fever after the completion of a stated period, without the administration of remedies, and, must we not add, sometimes in spite of them. The remarks of Cleghorn on this point were introduced at the conclusion of my last lecture on the pathology of congestive fever, and those of Valentini at that of the one on typhus fever. Two cases of what the author terms remittent continued fever, will serve to illustrate still more strongly the position now affirmed. The first is thus related by Dr. Tantini:

"On the 20th of August, 1811, there was brought to the hospital a young man thirty years old, a field laborer, who had been at work for some days in the marshes. He was of a robust frame and healthy constitution. For six days past he has been afflicted

with a continued remittent fever, of a malignant nervous character. His condition on his arrival was as follows: Fever, with a morning remission, followed by an exacerbation of heat, which declined in a notable manner on the approach of night; distress, great agitation at the beginning of the paroxysm; skin hot till toward its decline, which was indicated by some moisture of the skin; pulse weak, soft and frequent, sometimes a little intermittent; prostration of strength; ideas confused and irregular; slight delirium during the first few days of the fever; eyes bright; mouth dry; tongue parched, and marked with a dark line in the middle; lips and teeth dry; the chest and abdomen in a good state; urine abundant; alvine evacuations regular.

“I wished,” says Dr. Tantini, ‘to make a trial of the camphor proposed by Guarini, particularly in a case like this, in which the pulse was soft. I added to it gum arabic, as in the following formula: pounded gum camphor, a scruple; lumps of gum arabic, a drachm; mint water, two ounces; and I directed a bottle of lemonade, and half allowance. On the following day, that is, after the seventh accession, the patient had a copious sweat, and a remission from fever, which never returned. After some days of convalescence, he left the hospital well.’

“The philopharmacologist might persuade himself that the camphor had brought about the crisis, which in fact had nearly reached its termination before the physician prescribed any thing. In the next case, however, we have an example of the result which the unaided power of nature will procure. The narrative runs thus:

“*Remittent Continued Fever.* On the 26th of August, 1811, a young man of about 26 years of age, who was of a somewhat more delicate habit than the subject of the preceding case, and who had worked for some days in the marshes, was brought to the hospital. He had a continued remittent fever, the exacerbation of which came on at four o'clock in the afternoon, and was ushered in by increased heat, followed by feelings of great prostration; weak, soft and frequent pulse; great restlessness at the beginning, and a slight perspiration at the decline of the paroxysm. The functions of the stomach and bowels were regular; the urine in small quantity, and whitish; mouth dry; tongue foul. I contented myself,” continues Dr. Tantini, ‘with directing emollient fomentations to the lower bowels, a mucilaginous enema, barley water for drink, and the half allowance. After the seventh accession, he

had, like the other patient, a copious sweat, and the fever entirely disappeared.'

"After becoming acquainted with these and similar cases, one is tempted to ask the grave question—how much beyond the seventh paroxysm do we carry our feverish patients, by our emeto-cathartic, mercurial and stimulating remedies, which not seldom worry the digestive system, and complicate the primary disorder of the nervous?"

Had I an opportunity, I would say to the learned professor, and to all who are similarly situated,—yield, by all means yield to the impulse of your wounded conscience, or to the temptation, if you choose to call it such; "ask the grave question," and press it home to your own judgment, and to the judgment and conscience of your party in medicine, until they shall be compelled to observe the answer to that question, which independent, rational, Eclectic medicine is daily demonstrating before the world.

LECTURE XI.

MALARIAL FEVERS—CONTINUED.

Yellow Fever: History; When and where it prevails; Endemic and Epidemic; Symptoms and Course; Three Stages—1st, Primary Fever—2d, Abatement—3d, Collapse; Its occurrence in Charleston; Its prevalence in Natchez; Description of the town and surrounding country; Description of the Epidemic; Symptoms; General Remarks; Anatomical Character.

YELLOW FEVER.

History.—We will next take up *yellow fever*, or *typhus icterodes*. The other names which have been applied to the disease are generally expressive of the localities where it prevails, or of some of its characteristic symptoms. It is very peculiar in its character,—occurring chiefly in the intertropical climates, though it has been known to prevail occasionally further north as an epidemic. A high range of thermometrical heat during a succession of days or months, always precedes, and is regarded as necessary to produce the disease. It is never known to prevail except in places where the thermometer has ranged at from 70 to 80 deg. Fahrenheit for a great number of consecutive days, though there must be other attendant circumstances favoring its development, otherwise the heat alone will not produce yellow fever: but more of this presently. It occurs during the latter part of summer or beginning of autumn,—being rarely met with in early summer, and never after the appearance of frost. It seldom prevails further north than 40 deg. of north latitude, its ravages being much more common and extensive in the torrid zone, or adjacent borders of the temperate zones; and most prevalent also north of the equator, though it does occur in the southern hemisphere.

Yellow Fever has on two or three occasions prevailed epidemically in New York and Philadelphia, and once at least in Boston. It occurred at those times under peculiar circumstances, which will not be likely to obtain again. The attention which is now given

in those cities to sewerage, and other means to secure general cleanliness, will it is believed, indemnify them from future visitations of this disease. For it is a fact established by observation, that while yellow fever is almost exclusively confined to large cities, those portions of a city most densely populated, and especially where, from the lowness of the ground, the detritus and filth are liable to accumulate, are most obnoxious to it.

The disease prevails endemically in tropical countries, while its appearance at the North is usually under the character of an epidemic. By an epidemic is meant the general prevalence of a disease, with leading symptoms perhaps unlike those usually attendant upon it. Every kind of disease is liable to assume, occasionally, this character—the result it is believed of some atmospheric influence prevalent at the time, intensifying and aggravating the malady, where it is endemic,—that is, where it habitually prevails,—and favoring its development in districts where it is not usually found. Thus, yellow fever is an endemic in New Orleans, Charleston, and other Southern cities, but is occasionally greatly modified and rendered more malignant by this epidemic influence. Local circumstances may favor the development of the same disease in New York, Philadelphia or Boston, and should the atmospheric influence of which I have spoken prevail, then the disease would probably break out and prevail as we say epidemically. Cases occurring in certain localities, in the absence of a general, prevailing atmospheric cause, may with propriety be denominated sporadic.

Yellow fever exhibits perhaps, more striking peculiarities than any other disease, and is liable, to as great an extent as any other, to modifications and complications, resulting from various extraneous causes, or from differences in the conditions or constitutional idiosyncrasies of patients. In consulting various authors, for the purpose of availing ourselves of their observations in our efforts to ascertain the nature of the disease, we are struck with the multiplicity of the symptoms described as signaling it, and the great diversity of phenomena which have attended it, at different times and in different localities. It is stamped with the peculiarities of malarial disease in one locality, assumes a typhoid character in another; is mild and manageable on some occasions, at other times most obstinately and fatally malignant.

The *symptoms and course* of the disease, in its ordinary uncom-

plicated form, may be briefly stated. It is usually preceded by pretty well defined premonitory symptoms, not very unlike those of other forms of fever: differing very little from those by which a severe grade of bilious fever, for instance, is introduced. In fact, the similarity is often so complete that you would find great difficulty to distinguish between the diseases, or in this stage to satisfy yourself that they were not identical. It very often however, comes on suddenly, seizing its victim abruptly in the midst of apparent health. But as I have not enjoyed the advantage of practice in this disease, and can not therefore speak of its character from personal observation, but must depend upon authors for my information in regard to its symptoms, I can not it seems to me, render you a better service than that of producing extracts descriptive of the malady from certain credible authors—doing them justice at the same time, by giving full credit to each author respectively. And this mode I shall feel myself fully at liberty to adopt, wherever my own experience is deficient, or authors furnish information in a form adapted to my purpose.

Authors generally make a division of the course pursued by this disease into three stages. The *first stage* embraces an indefinite length of time, between thirty and sixty hours, during which the primary fever in its attendant symptoms prevails. The *second stage* is generally shorter than the first, but varies also very much in duration. It is devoid of fever, and might be termed the stage of abatement. It is generally characterized by great debility. This is followed by the *third stage*, in which the patient sinks into a state of collapse, tending to speedy dissolution, or a secondary fever sets in, inspiring a hope of recovery.

The following interesting description of this disease, as it appeared in 1817, in Charleston, S. C., is from the pen of Henry Dixon, M. D., and was published in "The Philadelphia Journal of the Medical and Physical Sciences," February, 1822. I introduce it here, as affording you a familiar and graphic delineation of the disease as it occurred under the writer's own observation, and at the same time, as exhibiting some peculiarities which marked the epidemic at that time and place. After preliminary remarks in reference to the weather; the prevalence of bilious remittent fever in the early part of the summer; the previous exemption of climatized persons from the disease; the terror of the inhabitants on finding "that no length of residence was a perfect security," as

proved by several cases which occurred, Dr. Dixon thus describes the disease:

"The symptoms with which this malignant epidemic made its appearance were somewhat irregular, varying in different cases. It would not be very easy to distinguish them into the peculiar or characteristic, and the common, or such as may occur in other fevers. At the beginning of the attack, every physician, however great his intelligence, was often liable to be deceived. Hence it became, at last, a rule to treat all cases, attended with any, the slightest suspicious circumstances, as yellow fever—and it was impossible to devise a better mode of conduct.

"When an individual, who had lately arrived from Europe, from a State north of us, or even from our own interior country, was seized with pains in the head, back, and limbs, pain in the epigastrium, with vomiting or inclination to vomit, great restlessness and anxiety, deep sighing, with a flushed countenance, a red and watery eye, a dry, hot skin, and an active pulse, no one could hesitate to pronounce it immediately an attack of yellow fever, and treat it as such without delay. The symptoms, however, were usually by no means so strongly marked, and it often happened, especially at the commencement of the prevalence of the disorder, that time of immeasurable importance was lost, in the use of remedies inefficacious, or, however powerful in themselves, unsuited to this form of fever.

"The patient often complained first of chilliness, though there was not usually any formed chill or rigor. After this, or, as sometimes happened at first, pains were felt in the head, back, and limbs, for the most part very severe. The *headache* seemed chiefly to affect the forehead, and frequently continued, in a distressing degree, through the whole malady. I saw one case in which it was so violent as to occasion constant watchfulness and repeated screamings; nervous appearance supervened, and it was for some time dreaded that the case would terminate in convulsions. The determination to the brain was in many instances so great, even at the commencement of the attack, as to produce some confusion of thought, or delirium. The lower were much more commonly affected than the upper extremities. The pains seem to be fixed mostly in the muscular parts, though in a few instances confined to the larger joints, as the knees, etc. The aspect of the eye, supposed to give one of the characteristic marks of the disease, was almost invariably the same—inflamed, very sensible to light, red

and suffused, well described by Jackson, as resembling the state of the organ caused by exposure to the smoke of green wood. Pain was felt, as if in the very center of the eye, and more particularly, I observed, in several instances, when the eye was moved from side to side without turning the head. The stomach, which seems truly 'the throne of this disease,' was generally irritable from the first, easily excited to the action of vomiting, which, when it came on, whether spontaneously or by anything taken, was uncontrollable, or restrained with difficulty. The patient complained, in most cases, of a feeling of soreness at the pit of the stomach, which was much increased by straining to vomit, or by pressure on the epigastrium. This pain was sometimes not at all felt, except when pressure was applied to the part, or when the vomiting was attended with much retching or straining. There was also a great degree of restlessness and anxiety, vast oppression about the præcordia, with heavy, deep, and frequent sighing.

"The respiration was slow and laborious, or embarrassed, hurried, and irregular. The countenance was peculiar and striking; so much so, that it was thought by many to mark the peculiar character of each case. The aspect was somewhat distressed, the face flushed and turgid, and this, with the watery redness of the eye, gave to the whole a most singular wildness and fierceness, combined with an expression of sadness and terror. The skin was mostly hot and dry. Cases, however, occurred, in which it continued through the whole, cool, moist, and pleasant, as in a natural state. One patient (Harper) was covered with a fine sweat during his four days' illness in the hospital, where he died. The yellow tinge, from which this disease has derived its name, was, in a few instances, soon perceptible, though, in a far greater number, not at all to be observed until the second stage. There was a peculiar feeling of constriction, or hardness and want of pliability in the skin of most patients, combined with heat and dryness.

"The pulse assuming the highest rank among our means of forming an opinion in cases of common fever, seemed very frequently, in the malady under consideration, to have no correspondence with the state of the system. I have found it, in some violent attacks, very little more frequent, full, hard, or tense than natural. Generally, however, it was in the first stage increased in volume, hard, quick, jerking, and irregular; sometimes small, slow, and corded, giving to the finger the feeling as if oppressed.

"The bowels were very torpid, and the constipation was with

difficulty removed by the most active cathartics. When stools were procured, they were often black, or dark colored, from the very first. The tongue presented a vast variety of appearances; sometimes moist, soft, and clean, at others with a smooth, whitish coat; again, rough, furred, hard, dry, brown or black, or of a yellow or orange color. When much furred, there was usually an unpleasant taste in the mouth. The thirst was, for the most part, excessive—the patient continually begging for drinks. But, if I am not mistaken, water was as often desired on account of the agreeable coolness which it produced in the burning stomach, as for the relief it gave by quenching thirst.

“These symptoms constituted the *first stage* of the disorder, the duration of which varied somewhat, with the different circumstances of the different cases. On the third or fourth day, according to these circumstances, the remission, so often described by writers, took place. The headache was relieved, the pain in the back and limbs disappeared, the skin became softer and moister, the pulse so natural as hardly to be distinguished from that of health, the breathing was easier, the pain and irritability of the stomach were lessened, the eye was less inflamed, and as the redness decreased, a yellow tinge became more and more perceptible on the adnata. The patient seemed to be, in a good degree, freed from his horrible anxiety and depression of spirits, and to be revived once more by the heart-cheering influence of hope. But hope here, as in all other human affairs, proves in general a deceiver, and a short time serves to dispel her illusions. In a few hours (if not previously controlled by our remedies) the disease returns, with a violence infinitely disproportioned to the powers of resistance in the constitution.

“Of this *second stage*, the most prominent feature is the very great debility under which the patient labors. His pulse sinks, there is great muscular prostration, and if his skin has not been discolored before, a yellow hue is now discernible, particularly on the forehead and breast. The irritability of the stomach is increased, nothing can be retained, and the vomiting, which was before attended with severe straining and retching, becomes very easy and frequent. A fluid of a dark color, so well known by the name of *black vomit*, is thrown off, usually in large quantities, seeming often to be ejected from the mouth with little or no effort on the part of the patient. The respiration is still more difficult and hurried, with frequent sighing, and intolerable distress about

the præcordia, attended occasionally by delirium. The alvine evacuations are large, and consist of a fluid apparently of the same kind with that constituting the black vomit. These symptoms increasing, death soon relieves the miserable patient from sufferings dreadful to contemplate.

"The duration of the disease was very various in the different cases—in some instances proceeding so rapidly to its close, that time was scarcely allowed for the exhibition of any remedies. At other times the progress was much slower, and the chief differences in duration were almost exclusively confined to the second stage. The first was, in all, of nearly the same length, lasting from *thirty to sixty hours*, except in those cases in which the powers of life were at once prostrated by the shock of the pestilence, and crushed beneath its overwhelming violence." * * *

"The recoveries from yellow fever were, in general, very slow, the convalescence lingering and tedious, and in many instances the convalescents were much troubled by the formation of large abscesses on the body and limbs, which did not suppurate kindly, and were very difficult to heal.

"As has been already stated, strangers were most liable to the attack of yellow fever. Those from Northern climates, Europeans, more especially the English, Irish and Scotch, were assailed violently, probably from their national habits and modes of life. The French and Spanish, who are nationally remarkable for temperance in food and drinks, had the disease, on the contrary, in a somewhat milder form. Natives also of our healthy back country, and even those from our marshy sea-coast, seldom escaped; and although Northern constitutions were most subject to the disorder, persons from our Southern sea-coast were by no means perfectly secure. The first instance I saw of an attack in such circumstances, was of a young man from a little seaport of St. Mary's, in Georgia. This of course made a deeper impression upon my mind, as I had previously been under the common mistake of supposing that, having been born or resided in the South, constituted a good degree of safety. Children, especially infants, being indeed in some points of view strangers, were peculiarly liable to the attack of this disorder, and its ravages among them were dreadful. The mothers of Charleston will long remember, with tears, the unhappy summer of 1817. Even adult natives and old residents, as before mentioned, were not entirely exempt. Cases of seizure among these, though not very numerous, were by no

means rare. The attack was violent, and the progress of this disease rapid, in the robust and plethoric, as well as in those who had been much exposed to the heat of the sun, the chilliness of our night dews, etc. The intemperate rarely survived, and their illness proceeded rapidly to its termination. But the most affecting mortality was that among children. Remedies seemed here of little avail, and it was often a melancholy lot of parent and physician, to watch without being able to arrest, or even retard, the rapid progress of the dreadful malady, or even relieve those pangs, from which the miserable little sufferer found refuge only in the grave."

To exhibit the effects of this disease in another locality, I extract the following, from "An account of the yellow fever of Natchez," as it occurred in 1819, by A. Perlee, M. D. Philadelphia Journal of Medicine, November, 1821; page 10, etc.:

"As far as a general description will apply, the symptoms of this fever were similar to those which have been recorded of the several epidemics of the same kind that have prevailed in various parts of the United States.

"Weariness, or sense of lassitude; shooting pains in the head, back and extremities; redness or inflammation of the eyes; dryness of the skin, with a remarkable feeling of constriction, as if the skin was contracting upon the body; loathing of food; costiveness; paucity of urine, etc. These symptoms, if not relieved by the remedies, were, in the course of from six to twelve hours, followed by vomiting of frothy matter; great irritability of the stomach; an indescribable sensation about the *præcordia*, excessively distressing—feeling somewhat as if the stomach was violently distended, and at the same time empty; liquids when swallowed, produced a noise like pouring them into a bottle. The pulse was generally little excited. The bowels were difficult to move, and the feces dark colored and very fetid; the skin was dry, and seldom warmer than natural; the tongue was slightly furred, of a yellowish-brown color. These symptoms were succeeded by yellowness of the skin, similar to that of a dark mulatto; but such appearance was not general. In this stage, there was frequent vomiting of dark colored matter, with violent and distressing hiccough, followed by great prostration of strength, *sub-sultus tendinum*, and death.

"The duration of the disease was extremely variable. Many died within three days, while others continued sick for two weeks

or longer. In some it appeared as a mild remittent, and proceeded ten or fifteen days without any dangerous symptoms, when suddenly the worst symptoms would take place, and carry off the patient in a few hours.

"A red, watery eye, with a dull aspect; preternatural floridness of countenance, without increased heat; that distressing sensation in the region of the stomach, before spoken of, and vomiting of black matter, were signs of the greatest danger, and generally proved the harbingers of dissolution.

"Early in October, many symptoms were observed, which indicated a near approach to the character of malignant scarlatina, such as an eruption of red spots upon the face, neck and breast; a deep crimson color of the fauces, tongue, and internal parts of the mouth; frequently accompanied with an effusion of blood, great prostration of strength, etc.

"Toward the end of this month and the beginning of November, the disease assumed many of the diagnostic symptoms of yellow fever, approaching in some measure the character of *typhus gravior*. An attack came on with great prostration of strength, without much pain, and soon afterward there was a disposition in the alimentary canal to diarrhea; weakness and slowness of pulse; profuse hemorrhage from the eyes, mouth, nose, and in females, from the uterus. The stools were very copious, and apparently mixed with grumous blood. Eruptions of petechiæ, resembling flea bites, were common. An increase of these symptoms was attended with so much exhaustion of strength, as to terminate fatally; death making its approach as a profound and oppressive sleep, seeming to result from an abstraction of the vital power, rather than its expenditure from violent morbid excitement. Putrefaction rapidly followed death, and in some cases appeared almost to precede it. A few patients who had labored under these symptoms, expired in the most awful convulsions. I saw two cases that terminated in buboes that sphacelated, and were a long time healing; both, however, ultimately recovered. After the subsidence of the more violent symptoms, there was great liability to relapse; and convalescence, in general, went on very slowly. The slightest fatigue, exposure, or improper diet, frequently produced a return of indisposition, and which was not without danger."

By these extracts you are furnished with descriptions of the disease, exhibiting not only its general course and symptoms, but also some

peculiarities resulting from special influences at different times and places. Similar extracts might be multiplied, and views of the disease in different aspects, and under a great variety of circumstances, might thus be afforded. But it is believed that careful attention to the symptoms and peculiarities already detailed, will enable you to comprehend the nature of this disease, so far as a description of symptoms can afford a clue to its character. You doubtless have observed, that according to the writers cited, and I might add that according to all writers, there is great diversity in the symptoms accompanying different cases. There is not a single symptom which may not be absent, even in a fatal case, and yet there will exist other symptoms so marked and peculiar, that no difficulty will be found in identifying the disease. Even the yellow skin, a symptom so constant in the latter stages of the disorder as to have given it a name, is by no means always present; and the black vomit may not be seen during the life of the patient, though it is probably always present in the stomach toward the termination of a fatal case.

It may not be improper in this place, to make a remark or two in regard to the character of the two last-mentioned symptoms,—the *yellow skin* and the *black vomit*. They will be observed to occur generally simultaneously, or nearly so, and I doubt not are dependent upon the same cause, namely, the deterioration, or decomposition of the blood. The morbid influences in the system probably produce an excessive development of yellow coloring matter, similar to that of bile, which is deposited in the skin and other tissues, and colors the urine. This produces the *yellow color of the skin*, which as the case progresses, becomes still darker, and not unfrequently assumes a bronze color, owing to a mingling of the yellow with the red coloring matter of the blood.

The *black vomit* was once believed to be vitiated bile, when the liver was considered to be the seat of the disease; but post-mortem examinations having exhibited in some cases a normal condition of the liver, with natural bile in the gall bladder, where black vomit was a prominent symptom, no foundation remained for such an opinion. Others have attributed it to a vitiated secretion of the mucous membrane of the stomach, but this opinion is not supported by facts. The most rational and satisfactory explanation of its character, and the one now generally adopted by the best authors, is based upon the chemical character of the matter ejected

from the stomach, and the condition of that organ and the tissues and fluids generally after death. The opinion thus formed is, that the dark colored substance thrown from the stomach is decomposed blood, which has passed by exosmosis through the relaxed tissues of the stomach, changed in some measure, it may be, by the vessels and acid secretions of the organ. This transudation is known to take place freely after death, and its occurrence during life need excite little surprise, when we consider the debilitated, relaxed, almost devitalized condition of the gastric tissues in a disease of this character.

Having progressed in the consideration of yellow fever, so far as to have given a general outline of its symptoms during the rise and progress of the disease, to a fatal or favorable termination, I come now to speak more particularly than I have done of the *anatomical characters* revealed by post-mortem examinations. Extensive, careful and critical investigations have been made, for the purpose of ascertaining the organic or structural changes produced upon the solids as well as the fluids of the body, by this fearful malady. And this branch of the subject is invested with the more interest, inasmuch as post-mortem appearances have been made the basis of doctrines that have held sway at different times, and upon which modes of practice have been instituted, with results in many instances fatal, both to the theory of the physicians, and the lives of their patients.

The *blood*, even when drawn during life, especially toward the termination of a fatal case, though it may coagulate, forms a coagulum less hard and firm than that of healthy blood. It seldom exhibits at any period of the disease the buffy coat, characteristic of inflammatory diseases—and when the system is brought fully under the morbid influences characteristic of yellow fever, the blood possesses much less vitality than in other malignant forms of fever. The clot, if formed at all, is brittle, friable, and more easily broken down than in other fevers; and in the more malignant forms of this disease, the blood loses its coagulability altogether, so that when drawn from the arm it remains in a fluid state, showing that decomposition has already commenced. This being the case during life, we would naturally expect to find after death, what is often the fact, the veins filled with dark, decomposed blood, in a liquid condition. The cause of these changes in the circulating fluid, can only be referred in my opinion to a great

loss of vital energy in the nervous system; and in reality, all the phenomena of this grave and fatal disorder, as will be shown hereafter, point to the nervous system as the seat of the disease.

I shall not attempt a description of all the minute changes that take place in different parts of the body, but shall confine myself to a general reference to the most important. As far as careful examinations of the *brain* have been made, following this disease, that organ and its membranes have generally been found in a diseased condition. The *dura mater*, usually slow to become diseased, has been found studded with specks of the coagulum of blood, accumulated in little particles near the surface; the *arachnoid* covered with a deposit of coagulated lymph, showing a low grade of inflammation; the *substance* of the brain generally more dense and hard than natural, owing I suppose to a contraction of the fibers. This latter is an important phenomenon connected with the disease, as in most diseases affecting the brain, the cerebral substance is found to be softened. Serum is sometimes observed in the ventricles. The vessels of the brain are often much distended; so also are those of the *spinal cord*. The latter however, is often differently affected in different persons; while in some the whole cord is found involved, in others the lesion is confined to a particular location; more especially opposite the abdominal cavity.—There is sometimes a dark coagulum deposited in its vessels, giving it a sort of bruised appearance.

The cavity of the chest also, has been carefully explored in the victims of this disease; and each and every organ has been found, in some cases diseased, in others in a normal condition. There is sometimes engorgement of the *pulmonary blood-vessels*; more frequently the mucous membrane of the *bronchial tubes* is affected, so as to contract the tubes; sometimes they are relaxed; more frequently healthy. In this, as in congestive fever, there have been found partial plugs in the aorta, occasioned by the blood becoming organized in passing out from the heart. This I have noticed in a number of cases of congestive fever.

The liver, once considered the essential seat of this disease, has been found exceedingly variable in its anatomical developments. Occasionally it is entirely free from disease, so far as the eye can discern; but in a majority of cases it is very much involved. Its condition however, differs greatly in different cases. Sometimes there is a congested, engorged condition of the vessels; in other cases, the hepatic substance is contracted, hard and brittle; and in

others, softened and beginning to be decomposed. As before remarked, it is sometimes apparently in a healthy condition, with the gall bladder filled with healthy bile.

The *spleen* also is variable in its conditions. It is more frequently engorged than the liver, and more perhaps than any other organ; though the obscurity of its functions, and consequently of its relation to morbid phenomena, is such that comparatively little interest has been felt in describing its appearances.

The *alimentary canal* has been very closely examined, and full descriptions of its developments are on record. This canal, and especially the stomach, has generally been regarded as the part on which the disease spends its chief violence; and though not the primitive point of invasion, there can be no doubt that the *stomach* more uniformly suffers, not only functional disturbance, but structural lesion, than any other organ. A softened condition of the mucous membrane is very common, and it is said that the intestines have been found perforated, so that fecal matter was discharged into the peritoneal cavity. This was not the result of ulceration, but as it were, a softening and giving way of the fibers of the intestinal parietes. The *duodenum* seems more frequently and more deeply involved than the jejunum or ilium, though these do not generally escape. The rapidity with which the disease runs its course, prostrating the nervous system, and as it were, abstracting the vital principle from the tissues, generally allows little time for those secondary lesions which often attend fatal cases of ordinary fevers. But when the secondary fever sets in, as it will if the disease do not early destroy the patient, the case, as has been shown, will assume the typhoid character, and the autopsic condition of the small intestines then always corresponds with the external symptoms.

LECTURE XII.

MALARIAL FEVERS—CONTINUED.

Yellow Fever continued: Cause, Vegetable and Animal Malaria, Reasons given, Additional Facts; Extracts from Dr. Perlee—Yellow Fever in Natchez in 1817 and 1819; Dr. Dixon on Yellow Fever in Charleston, 1817; Reference to other cases; Circumstances necessary to produce Yellow Fever; Contagiousness discussed; Diagnosis; Prognosis; Treatment; Quinia and Iron; Other Remedies; Remarks on Cathartics, Mercury and Linct; Convalescence; Means of Prevention; Case Treated by Prof. Morrow; Treatment by Dr. Mc Voy, by Dr. Thomas.

YELLOW FEVER—CONTINUED.

The cause of yellow fever has been the subject of much discussion, and various opinions are held by the recognized authorities. After reading the history of the disease as it has occurred at different times and in various places, and considering all the phenomena which generally precede and accompany its visitations, my own mind has settled down upon the opinion that the disease, wherever met—whether as an endemic or epidemic—is produced by the *conjoined influence of two kinds of malaria*: one resulting from *vegetable*, the other from *animal matter*, in a state of rapid decomposition. The reasons for this opinion I shall endeavor briefly to state.

The facts to which I will first refer, as grounds for my opinion, are connected with the habits and characteristic peculiarities of yellow fever. These will be observed to hold about an intermediate position between those of bilious or marsh malarial fever, on the one hand, and of typhoid or enteric fever, on the other; the latter disease being, as I am convinced, dependent on animal or idio-miasm. There appears to be less general susceptibility in all classes of community to yellow fever than to bilious, while there are not so many exemptions as are recognized in regard to typhoid. Yellow fever does not as generally preclude a second attack as does

typhoid, but has that influence in a greater degree than bilious fever. The effects of acclimation, as a protection against the disease, are about the same as in the other two. The symptoms of yellow fever in the stage of invasion, seem identical with those of bilious fever,—often indeed well marked by periodicity at first; the symptoms of the stage of prostration are not dissimilar to many of those which signalize malignant intermittents, combined with the low state of the vital forces characteristic of typhoid disease. Finally, when a reaction does occur, and the disease is protracted, the typhoid character becomes clearly established. Thus the two miasmata are acting upon the system together; the vegetable being the more active, first impresses its influence upon the patient; to this is soon added the depressing power of the animal poison, which of course materially modifies the symptoms; and if the constitution have sufficient stamina to sustain the shock, it is finally relieved in a measure from the more active and more transient koino-miasma, and is left to struggle with the prostrating power of the more tardy but tenacious animal poison.

The above view of the compound character of the cause of yellow fever, is much strengthened by numerous well established facts. It occurs at those seasons and in those localities favorable to, and prolific in the production of both the other forms of fever of which I have spoken. Its invasions are generally preceded by the prevalence of bilious fever in the community, so much so as to lead some to believe that it depends alone upon that cause; but, with remarkable pertinacity, it confines its ravages to those places where a dense population is found, and animal deposits are abundant—as in the most crowded and filthy portions of maritime cities. Long continued heat, after the surface of the earth has been thoroughly soaked with water, producing that combination of heat and moisture so favorable to both kinds of miasm, invariably attend its invasions. The permanent character of the locality both as to soil and climate, where it prevails endemically, are precisely such as favor my views, and the existence of similar circumstances temporarily, where it has prevailed occasionally as an epidemic, seems to leave no room for doubt as to the correctness of the opinion above stated.

To show that the facts to which I have referred do really exist, I shall make extracts from the records of respectable eye-witnesses. The first is from the pen of Dr. Perlee, in his description of yellow

fever as it occurred in Natchez in 1817 and 1819, in *Phil. Jour. of Med. and Phys. Sciences*, Vol. III., page 1 :

"Natchez is situated upon the eastern bank of the Mississippi, in Lat. $33^{\circ} 31' 46''$, N. Long. $6^{\circ} 6' W.$, on an elevation of about one hundred and fifty feet above the surface of the river at low water. The shore forms a high bluff or precipice—which, rising rather above the site of the town, excludes the view of the river, running close to the foot of it, when raised by the vernal floods. The surface is very undulating, so as to require an extensive digging down of hills and filling up of hollows to make streets conveniently level. The soil is a rich, black mold; the sub-earth, sand, clay, etc., as low at least as the surface of the river. The whole mass exhibits strong marks of being oceanic alluvion, extremely light and soluble in its texture. The country adjacent on the same side of the river has generally the same appearance, with a gradual but irregular declivity for about three miles eastward, to the creek St. Catharine. The fragility and solubility of the earth render it liable to be washed into deep and numerous ravines, which become the receptacles of water and various substances liable to putrefaction. The western side of the river is one immense flat of alluvion, containing extensive swamps, and interspersed with many lakes and ponds." * * * *

"The western section of the State of Mississippi abounds in those causes which in warm climates or seasons generally produce bilious fever. A soil of extreme fertility, having an immense vegetable production, the leaves and offal of which are annually deposited upon the surface—which, by its declivities, admits an accumulation in hollow or flat places, when becoming saturated with moisture, they soon run into a state of putrefaction. Extensive swamps filled with putrescent substances—numerous creeks and bayous,* which frequently overflow their banks, leaving them covered with a sediment that emits very offensive exhalations—and the western boundary forming the bank of the Mississippi, which, by the subsidence of its waters, exposes an immense surface to the sun, form other prolific sources of pestilential emissions."

* * * *

"The salubrity promised by the natural topography of Natchez, has been evidently impaired by the means used to improve the site of the town. The earth of which the hills that have been dug

* "A provincial appellation given to gullies or ravines that occasionally carry off water."

down were formed, contains numerous particles of partially decayed vegetable and animal substances, which, when exposed to heat, air, and moisture, quickly undergo the putrefactive process. The earth itself being loosened, absorbs large quantities of water, which retained, assists the operations of this laboratory of pestilential exhalations. The natural water courses being obstructed, ponds are formed, which soon stagnate—and at every fall of rain receive copious additions of filth. The cellars in many parts of the city, particularly those situated in the loose new-made earth, are liable by every copious rain to become partly filled with water—and frequently containing quantities of putrescent matter, form another very obvious cause of disease. In consequence of the filling up the streets and alleys, the back yards of many houses are lower than the adjacent ground—and having no drain, admit of large accumulations of kitchen offal and other offensive matter. The streets not being paved, are by every considerable rain covered with mud several inches in depth, which, being mixed with the excrements of the herds of horses and cattle with which they are crowded, emit a most offensive effluvia, in warm, moist weather. The privies are also very much neglected, and being frequently so situated as to have their sinks receive water, are abominably fetid. The burying ground is another nuisance of a moist, noxious character. Located almost in the compact part of the city, and the earth being of the lightest texture, very partially prevents exhalation from the dead bodies deposited there, many of which were buried during the prevalence of the epidemic, in very open or carelessly made coffins, in shallow graves. The effluvia hence arising was exceedingly offensive in the warm, still mornings and evenings of the latter part of 1819.”

“In addition to all these causes, which would make a *Montpelier* sickly, there is a general neglect among the inhabitants in their cellars, yards, outhouses, etc. Can it be doubted that such causes are not amply sufficient to produce malignant fever in a climate where the temperature, for at least five months in the year, is as high as eighty of Fahrenheit—the average temperature of the whole year not below sixty-five—and the quantity of rain as much as fifty-five inches?”

Speaking of the year 1819, Dr. Perlee says:

“The winter and succeeding spring were mild, and no particular disease prevailed. The summer set in very warm. The month of June, though warm and rainy, still continued healthy. July was

attended with an increase of temperature, and an extraordinary quantity of rain,—greater than had fallen in any one month for nine preceding years. During the last four days of the former and first three of the ensuing month, there were tremendous torrents, occasioning extensive and destructive inundations of all the low grounds adjacent to the water-courses. At the subsidence of this flood, hundreds of acres along St. Catharine's creek were covered with sediment, from a few inches to several feet in depth, which, after it had been exposed to the sun, and the surface become dry, cracked open, and emitted most offensive exhalations from the putrefying substances beneath. Great numbers of cattle, sheep and hogs were drowned, and afterward lay putrefying upon the surface. The sickness and mortality prevailing along the whole course of this creek evidently resulted from this inundation. The streets of Natchez were completely deluged, and became a bed of mortar. All the low places that had the drains obstructed were filled, and also most of the cellars, in a greater or less degree. This rain was followed by extremely hot weather, with a very bright sun. The months of September and October were very warm and dry.

“About the middle of July many cases of intermittents were observed, mostly attended with copious excretions of bile. The negroes upon the plantations suffered severely. Not a few who recovered from the first attack of fever, were carried off by violent diarrheas. The type of the fever progressively assumed a more serious character. About the beginning of August, remittent or double tertians greatly prevailed, and several persons died. The increased number of cases that occurred in the beginning of September, excited considerable alarm, and induced the board of health to request the physicians to report the first cases they might observe indicative of malignity. On the first of the month I was directed to visit four men lying sick at the upper end of Main street, who were said, by the neighbors, to have the yellow fever. After a careful examination of them, I reported their disease to be a severe bilious remittent, unattended with symptoms of malignancy, but that I apprehended, if the severe warm weather continued a few days longer, such symptoms would probably appear. I suggested that the large pond of stagnant water very near the house was the cause of this sickness, and advised it to be drained, the bottom scraped and covered with lime. This was not done till the sixth day, and then very imperfectly. On the third day one of these men died, and it was asserted by the good woman of the

house, of the black vomit. The attending physician did not report it as a case of yellow fever, the existence of which in Natchez he obstinately denied. He fell a victim to it himself. On the second day of the month I was called to visit three men in the same neighborhood, who had been employed in a work-shop very near the before-mentioned pond. At the same time another man, who belonged and worked in the same shop, was taken sick and removed further down the street, where he died on the fourth, and was formally reported by his physician to have died of yellow fever. On the evening of the third, one of my patients was removed to the lower part of town, where I found him next morning with every pathognomonic symptom of the epidemic. On the same day a man died at the Natchez Coffee-House, with black vomit, sallow skin, and such other symptoms as left no doubt on the minds of the medical men who saw him, of his disease being yellow fever. The three cases being reported to the board of health, they immediately published a handbill, announcing the existence of the disease, and advising the inhabitants to remove into the country without delay. These facts coming under my own observation, I can attest the truth of them, and have no doubt that the fever originated from local causes exclusively."

Here you observe, the rain, the heat, the local circumstances, the vegetable and animal putrefactions, all favor the production of the compound or idio-koino-miasmata, and the gradual progress of the disease from intermittent to remittent, and this increasing in malignancy until yellow fever is finally developed, exhibiting, "in some measure," as the author elsewhere remarks, "the character of typhus gravior," with "a disposition in the intestinal canal to diarrhea," "eruptions of petechiæ resembling flea-bites," etc., all incontestably sustain the doctrine I have advanced.

To show that this is not an isolated case, I produce the statements of Dr. Dixon, from his description of the yellow fever of Charleston, S. C., in 1817, before quoted.—"Philadelphia Journal of the Medical and Physical Sciences," Vol. III., page 250. He says:

"The spring of this year was distinguished, in our city, by the frequency and violence of the common diseases of children. Great numbers were carried off by cholera and atrophy, and the process of dentition was unusually dangerous. The summer set in with such floods of rain as had seldom or never before happened within the memory of the oldest inhabitants. But these seemed to fail of their usual effect in producing coolness of the earth and air, for

the weather was steadily warm, though perhaps not so hot as the average of our summers. The range of the thermometer was generally between 82° and 88° Fahrenheit. Thunder storms, which in ordinary seasons are of frequent occurrence in our climate, were observed to be extremely rare, as well as slight.

"The country fever, a form of bilious remittent which has obtained this name among us, as chiefly seizing those who have exposed themselves by sleeping among the marshes of our low country, after the coming on of warm weather, made its appearance this year earlier than usual, and attacked many who considered themselves perfectly safe, as having removed to the city at the usual period, about the end of May. Its attacks were also peculiarly violent and fatal, the number of deaths from it being greater than had ever been known before.

"The common bilious fever of our climate was also more than usually severe, and numerous cases of it were recorded in our bills of mortality. This concurrence of circumstances, however, did not seem previously to create any dread, though it is evident from them that our atmosphere was infected with some principle unfriendly to life and health.

"It was not until the 23d of July that the yellow fever appeared among us, and, spreading with considerable rapidity, soon excited universal alarm.

"The first case which I have been able to ascertain, was that of a Mr. McCoy, who lived in a low and dirty part of the town, on East Bay street, between the Market and Exchange."

Here, then, we have a similar state of things preceding and accompanying this disease in a locality where it is endemic, and where, as the same author conclusively shows, it originates in local causes and not by importation. In a subsequent part of the same paper, Dr. Dixon says:

"That the yellow fever is an endemic of our climate can scarcely be doubted. The facts which go to prove this point are so numerous and clear, *that the contrary opinion is not held by any physician of this city with whom I am acquainted.* I have been informed by Dr. G. P. Prioleau, whose statement on this, as on all other subjects, is entitled to the highest consideration, that during his long and extensive practice, no single summer has passed, in which he has not met with some case or cases of yellow fever.

"It is impossible to account for the appearance of the disease among us every year, on the plan of importation. If such were

the fact, it is evident that sea-faring men, and that class by business connected with them, would be the most liable to be attacked. During several seasons, however, not a single case was brought into our marine hospital—so that sailors often escaped entirely while others were seized—notwithstanding the fatigues and exposures which, in all southern ports, mark them as peculiarly the victims of fever.

“McCoy, the first case in 1817, clearly appeared to have had no connection with any shipping, and was in no way exposed to contagion or fomites before he was taken ill. Can these facts be made to agree with the supposition that the disease was imported into our city?”

To the historical facts thus adduced, others might be added, derived from the visitations of yellow fever at other places, as New York, Philadelphia, etc. But the foregoing is deemed sufficient to sustain the doctrine of the compound malarial origin of the disease. I must refer such as desire further historical information on this point, to the various works containing accounts of the prevalence of this disorder in different places. My limits will not admit of further extracts.

This subtle compound miasm then, is necessary to the production of yellow fever; yet the disease is not always developed even where the miasmatic cause prevails. This cause must exist in a very high degree of intensity, and meet with a constitution predisposed by habits of life, much exposure, or other depressing influences, to insure the production of disease in its full malignancy. Hence, most of the community escape, especially acclimated persons, even where the disease prevails with the power of an epidemic. Under such circumstances, all perhaps will be sensible of a depressing influence operating on their constitutions. Some will have a very mild attack, and cases will occur of every grade of character, from a slight indisposition to the stroke which lays the walker prostrate in the street. So that having satisfactorily ascertained the specific cause of the malady; all its various phases, phenomena, anomalies, degrees of virulence, and other peculiarities, are to be explained, as in the case of other fevers, on the ground of differences of constitution, combination of local instances, complication with other affections, etc. It will be recollected that these peculiarities were extensively discussed under the head of intermittent fever. It will also be recollected that it was there shown, that the mild intermittent of the north, was only

a different grade of the same disease, which is often so malignant in southern climates. Now, to the malarial influence which produces malignant intermittent or remittent fever, let there be superadded a miasm capable of developing a low grade of typhoid, and you will, where other circumstances favor it, have genuine yellow fever.

Much space is allotted, in the books, to a discussion of the question whether yellow fever is or is not a *contagious* disease. From what has been said of the cause, character and history of the disease, it is unnecessary for me to say that I do not regard it as a contagious malady. As an endemic, originating annually in its accustomed localities, and whether prevailing as an endemic or epidemic, confining its ravages to certain circumscribed limits, and disappearing on the occurrence of frost, it certainly exhibits none of the marks of contagion. True, a constitution which has once suffered from the disease, appears to be in a measure protected from a second attack, and this has been thought to bring it within the class of contagious diseases which exhibit that peculiarity. But it is not clearly established, that persons who have had yellow fever are exempt from future attacks. Numerous instances are on record of fatal cases, where the victims of the disease had the second or third attack. Such instances are comparatively frequent among those who do not reside permanently in the regions where the disease is endemic; and it is very questionable whether one who has had yellow fever, is fortified against it, any further than acclimation protects him who lives through the epidemic season, without taking the disease.

Finally, I remark on this point, that fevers resulting from marsh miasmata, such as ague and fever, bilious fever, etc., are not even suspected of being contagious; that typhoid fever, which is produced by animal miasm, is not propagated by contagion, as will be shown hereafter; and we would scarcely expect to find the contagious character attach to a disorder resulting from a combination of these two non-contagious causes. This consideration alone, in the absence of well-attested facts to the contrary, must lead us to conclude that yellow fever is not communicable by contact or *fomites*.

[As the early writings of Dr. Dickson have been freely quoted by Prof. Jones in elucidation of the characters of yellow fever, it is perhaps proper to insert here his testimony as to the communicability of the disease, after the experience and observations of many years practice in a city which has frequently been visited by

the epidemic. The conclusions at which he has arrived, appear to me inevitable, from all the reliable data to which I have had access, and if correct, they constitute an unanswerable argument in favor of thorough and efficient quarantine regulations, to secure cities from invasion during those seasons in which the spread of the disease is to be apprehended. The following is an extract from an article on yellow fever written by Dr. Dickson, and published in the Charleston Medical Journal for November, 1856:

“With regard to the immediate source of yellow fever—the *causa causans*.—We may now safely assume it to have been logically proved that it is the effect of the presence and influence of a definite material agent, and does not depend upon mere hygienic conditions, of whatever character or complexity. It is difficult to argue with a man who can now doubt the communicability of this pestilence, its transportation, or the transportation of its cause from place to place. It has been so obviously and often carried on ship-board from an infected to a healthy locality, and under so many contingencies has given rise to unmistakable attacks among those who, in these healthy localities, have visited the infected vessels, that this point admits no longer of reasonable question. Some of these vessels have been foul; some very specially foul. Some of them have been clean and neat; some very specially so.

“But if transportable in the holds and cabins of ships, it is impossible to comprehend how this *materies morbi*, whatever may be its nature, shall escape being carried about, in other modes of conveyance. Even Drake acknowledges its having been transported in boxes of merchandize. It seems not unlikely that it may become entangled in many substances of greater or less looseness of texture, which may thus assume the function of fomites. Whether the amounts thus conveyable shall be efficient for the production of disease, must be determined by experience. Analogy does not decide this point. Small-pox and the plague are thus efficiently communicated; the typhoid poison rarely if ever; malaria not at all.

“Next comes the inquiry, whether the material cause of yellow fever is self-diffusive in its tendency, and if so, to what degree? We infer that it is largely diffusive, from a vast number of notorious facts. Not only did the L’Eclair infect those who boarded her in England and at Boa Vista, but she originated and spread the pestilence at the latter island. Thus also the abandoned schooner towed to the landing of an isolated plantation in the

Bayou Fâché not only gave the fever to those who took possession of her, but diffused the same curse upon the whole settlement. So also was it with the Mandarin at Philadelphia in 1852; with the Ben Franklin in Norfolk harbor in 1853; and this year with the Fashion at Governor's Island. These coincidences, undenied and undeniable, to which I could go on to add a lengthening list, have now multiplied to an overwhelming amount, laughing to scorn all the narrow efforts of special pleading, however astute, to explain them away; and establish beyond all reasonable doubt the relation of cause and effect between the presence of the infected ship and the infection of the neighborhood. How else account for the repeated occurrence of the yellow fever at the Quarantine Ground on Staten Island, and along the shore and vicinity—the invasion this year of Fort Hamilton and Gowanus, Brooklyn, etc., on Long Island, near the anchorage ground of the squadron detained under the yellow flag? Nay, we need not resort to such examples to illustrate the fact of this diffusiveness. According to the anti-contagionists and anti-quarantinists, who contend for the local origin of this pestilence, wherever existing, it arises from certain contingencies which they tell us are met with only in the vilest and filthiest parts of our towns and cities. But, as is well known, if it finds in such places any considerable number of subjects, and does not soon cease, it will not fail to spread itself on every side, and into districts of unimpeachable propriety and purity. In different seasons, as is equally well known, this diffusiveness varies greatly—a fact not explained upon any known or palpable grounds.

“The material cause of yellow fever then is transportable from place to place—on board ships certainly, and perhaps in other modes—and is self-diffusive. How is it generated—whence derived? Can we produce it, or witness its production in any laboratory, on a large or a small scale? Is it the incidental or accidental result of the combination of known elements, terrene or atmospheric, or both? Or rather is it not altogether inappreciable except by its poisonous effects? * * * * * * *

“Let us ask, then, What are the varying conditions most frequently observed to occur concurrently with the invasion of yellow fever? It is clear that we shall gain no light on these points of inquiry, in localities where yellow fever is constantly present. No one pretends to have indicated any characteristic features in which these localities constantly differ from other places not subject to the infliction. We must therefore prosecute our search in those

regions in which the pestilence is an occasional visitant. Now it has already been clearly proved, and this ground need not be gone over again, that there is not any *known* or *appreciable* condition of earth or air—terrene or atmospheric—uniformly attendant when yellow fever exists, or uniformly absent when such localities are free from it. Charleston, for example, presents nothing to the most acutely attentive eye in 1856—nor did she in 1854 and in 1852, which could lead the most sagacious hygienist to predict an invasion, which she escaped in 1851, 1853, and 1855. Her external or superficial identity was perfect; her internal social history, alas! how lamentably contrasted! * * *

“One single coincidence has always presented itself in connection with the occasional prevalence of yellow fever in places where it is not annually or permanently endemic. Whether it occur in New York or Boston, Philadelphia or Baltimore, Norfolk or Charleston, Savannah or Mobile, it is always coincident with, or subsequent to some foul arrival from the West Indies or New Orleans, perpetual sources, as I suppose will be admitted, of the pestilence. Unless New Orleans is suffering from it, yellow fever will never show itself at Vicksburg or Memphis. When Mobile is healthy, neither Springhill nor Citronville will be assailed. Augusta, Blackville, Beaufort, and Georgetown may be insured against it, provided it does not previously become epidemic in Savannah or Charleston. The recorded coincidences, if they do not prove the relation of cause and effect, are truly marvelous. The Fashion this year at Governor’s Island; the Mandarin, in 1853, at Philadelphia; the Ben Franklin, in 1855, at Norfolk; the Concha and others, in 1854, in our harbor, and this year the continuous squadron of foul vessels, sometimes amounting to nearly a score in number, lying ‘in the stream,’ but a short distance from the wharves, with which, in the meanwhile, they kept up a continual intercourse by captains and consignees and their boats’ crews, lighters, and lightermen—the latter furnishing, according to the record above quoted, two of the earliest subjects. If all these were safe and innocuous, then we may conclude, indeed, that there is no such thing as a material poison capable of exciting yellow fever pestilence, or that it is incapable of transportation from place to place, or of diffusion through the atmosphere. We must further conclude that this dreadful and ubiquitous malady can arise *sua sponte* anywhere, in ‘sound, clean vessels in the stream,’ in the neat, well-ventilated wards of our Marine Hospital, and in the very choicest

parts of our city, while the docks themselves, and all our worst lanes, alleys, and foul spots are exempt and healthy.

"As to the miscellaneous conditions included under the wide term 'locality,' and supposed to comprise the unknown causes of yellow fever, let us ask why should Beaufort ever suffer? No human community can offer neater residences, a more salubrious exposure to sea-breezes, cleaner or dryer streets. What is to be said of so many other similar southern small towns and places of resort, where taste, wealth, and leisure combine to protect the public health? If Blackville can generate yellow fever in our sandy middle country by the decay of wet lumber, as has been suggested, how could the vicinity of any of our mill-ponds hope to evade the pestilence?

"I saw at Aiken, in October, 1854, a perfectly well-marked case of hæmagastric pestilence: let the hygienist explain how it was generated there in that peculiarly favored region. Another similar, contingently connected with it in a very interesting manner, occurred about the same time in one of our low country parishes: both attacks were fatal. The young subjects, Messrs. M. and G., were students in the same medical office in Aiken. Four cases of yellow fever had taken place there—one of them in the house in which Mr. M. resided, among persons who had fled too late from the Charleston epidemic: all of these had been attended by their preceptors. No other exposure had been incurred by either of them beyond what is to be inferred from the above statement, unless we regard as such the passage of each of them on the railroad through the village of Blackville, where there were several cases of yellow fever. Mr. G. went down into St. John's, where he died in a few days. Mr. M. visited Columbia, a perfectly healthy place, and returning again through Blackville, was taken ill very soon, and also died. It is not known that the mere transit through the streets of Blackville in the cars was injurious to any other persons among the thousands who made it. Nor was there a single case of yellow fever among all who attended and surrounded and remained with the subjects of disease above mentioned. If these patients died of yellow fever—and concerning one of them I speak with absolute confidence—how did they contract it? That they two should be exclusive sufferers from the slight exposures which failed to affect others, is really remarkable. * *

"How unreasonable a stress has been laid upon these failures to infect in such examples is well illustrated in the following

paragraph from Ranking's Abstract, July, 1858, p. 170: 'Prof. Christison, of Edinburgh, informs us that in thirty-two years' experience it has been ascertained that in fever wards all the attendants contract the disease sooner or later; but that on the other hand, in private domiciles fever seldom spreads. In fact, though he has attended upward of one hundred medical students who had caught fever in hospitals, he has never known an instance of its spreading in their lodgings. His testimony is amply borne out by Drs. Bright, Williams, and Latham, all of whom consider that a few fever patients can without danger be admitted into general wards, while the accumulation of cases in a separate ward can not be made without danger to all who come in contact with them.'

"It is in exact correspondence with this experience of 'thirty-two years,' that we find the dispersed and widely scattered cases of yellow fever which happen throughout the country among those who fly from cities visited with the pestilence, terminate fatally or favorably without spreading the infection. Such is the rule; exceptions sometimes occur.

"A few days ago, while on a visit to upper Georgia, I heard on the spot a story closely resembling that of Mr. and Mrs. McManus, so frankly and forcibly told by Prof. E. D. Fenner, in one of the volumes of the American Medical Association. Mr. L., from a very healthy locality, ran down by railroad to Augusta, on business, during the epidemic of 1854. Shortly after his return home he was taken ill and died of yellow fever. His wife, who had not left the spot for months, nursed him assiduously, was promptly attacked in the same manner, and died also.

"From the Rev. Dr. B***** I have the following very definite statement: In the summer of the year 18—, when the yellow fever prevailed here, he and a Northern friend sailed for New-York. Arriving in the harbor, they evaded the quarantine restrictions very readily; and landing in New Jersey, went up the Hudson River, his friend stopping at Red Hook. After a visit of about a fortnight to Troy, Dr. B. came down to see his friend and found him just recovering from yellow fever, which almost immediately after attacked two of his household, proving unhappily fatal to both.

"In regard to this important topic much remains yet to be learned. We are not permitted to take things hastily for granted in the vast domain of the unknown and unexplored which lies before and

around us. When we meet an apple-tree in a deserted field or a grown-up young forest, no one pronounces it like the neighboring trees—indigenous. The pride of India, the lagustrymia, the ailanthus, the tallow-tree, and many more, are scattered all over the country. None of them belong to us; some of them appear without having been properly planted; some of them are untraceable; nay, of the majority we only know that they were introduced from abroad, but are ignorant when and by whom imported, and how. Very often, indeed, we can not discover either how, when, or by whom they were placed in their present locality.

"Thus, as I believe, yellow fever is originally of African origin, but finding on the shores of this Western world, both island and continent, like the African variety of man, and the Asiatic cholera, a congenial *habitat*, it has struck deep root, and fastened itself with a most lamentable tenacity in its new home. Now we can not, or ought not to wonder, assuming for a moment that it is a specific disease, depending upon a specific *materies morbi*, capable of persistent retention of its qualities, and among them self-multiplication and self-diffusion; I say we must not wonder that its dispersed and widely-scattered germs shall under favoring circumstances be developed, and produce the special poisonous effects for which they are characteristically adapted. This must rationally be expected to occur rarely, but it is enough to show that it is not impossible. Thus, and thus only, arise sporadic, and apparently spontaneous cases. No other origin of yellow fever has yet been shown to be possible."

The *diagnosis* of this disease in the first stage is attended with difficulty. It presents the usual symptoms of fevers in their incipient stage, with no symptoms to distinguish the disease, or if any, they are very obscure. There is sometimes it is true, an early development of diagnostic symptoms, upon which an opinion may be based with some degree of certainty. These are those severe pains in the back and loins which have heretofore been mentioned, the injected conjunctiva, and the flush of red on the forehead and face. Where these occur under extraneous circumstances, calculated to suggest the probability of an attack of yellow fever, little doubt would remain. But suppose the disease had not prevailed in the community, and was not anticipated, what peculiarities would mark the first case in the first stage, so as to enable even an experienced practitioner to decide that the case was an invasion of yellow fever? My answer is, I know of none

I well recollect a case illustrative of the liability of physicians to fall into error in forming a diagnosis in the early stage of aggravated forms of bilious fever. A gentleman visited Boston with a view of purchasing a stock of hides. He suffered considerably, during his absence from home, from fatigue and mental anxiety. On his return he at once exposed himself, for some time, to a cold, damp atmosphere, in repairing a water wheel in a mill-race. The result was, an arrest of all cutaneous secretions and exhalations, followed by the symptoms of a violent attack of congestive fever. The attendant physician pronounced it a case of yellow fever. Physicians were attracted from all parts of the country to examine the case; ropes were extended across the street, leading to the house, and the citizens of the village forbidden to pass. The most active measures were employed, according to the usual method, for the cure of yellow fever. But the patient died without a development of any other pathognomonic symptoms, than those which mark an aggravated case of congestive fever. His death, in all probability, is attributable more to the harsh depletory treatment than to the disease.

When the primary stage has passed, and especially at about the commencement of the third stage, the diagnostic symptoms are generally well presented. The primary fever has subsided; the eyes and skin are tinged with yellow; there is great prostration, when the third stage sets in, unless a secondary fever should occur. These, with the great gastric disturbance, and especially the black vomit, are the chief phenomena that distinguish this from other forms of malignant fever.

The *prognosis* has always been regarded as unfavorable; and the term is perhaps correct in a general sense. The disease has generally been characterized by great mortality. Its character in this respect has however, been much modified by the reform introduced in treatment by Broussais, of Paris. Whenever and wherever the lancet and calomel have been the chief reliance for its arrest, its fatality has been very great; but under a different mode of medication it has proved much more manageable; and, as in other grave disorders, the remark is true, that the results of the disease depend much upon the treatment which is to be pursued. Different visitations of the malady vary in respect to their mortality. Sometimes it is very malignant, and nearly all who take it die; in other seasons its grade is in the general mild, and few fatal cases occur. Its fatality varies also in different periods of the same

season; being generally more virulent when it first breaks out as an epidemic, and becoming more mild as the season advances. It differs also in its malignancy in different districts of the same city, according as the cause is more or less concentrated. All these general views it will be necessary to take, in forming an intelligent estimate of the character of this disease during its prevalence in a community.

Your prognosis in individual cases will have some regard to the general character and tendency of the disorder in the neighborhood. Your opinion of the result of a given case will however finally depend upon the favorable or unfavorable character of the symptoms presented. The unfavorable symptoms are redness and a watery appearance of the eyes; preternatural floridity of the face in the absence of a corresponding increase of heat; great præcordial distress and exceedingly severe pains in the back, limbs and head; a rapid but feeble pulse; coma or convulsions; sighing respiration; depression of the mental powers, especially a sullen indifference; a very severe but brisk febrile stage; suppression of the urinary secretion; a tendency to hemorrhage; a craving desire for food; and the appearance of black vomit.

The prognosis is peculiarly unfavorable where the patient has been a drunkard. In the case of unacclimated strangers and of children the disease is generally attended with great fatality.

On the contrary the absence or appearance in a mild form of the foregoing symptoms, and any facts or symptoms indicating energy of the nervous system, and a tendency to respond promptly to appropriate remedies; a protracted primary and moderate secondary fever; a tendency to moisture of the skin; dark colored bilious discharges; cessation of vomiting; diminution of præcordial distress and of neuralgic pains; and clearing off of the tongue may be regarded as favorable signs.

Treatment. While yellow fever was considered an inflammatory, hepatic affection, the lancet was early brought into requisition in every case; rivers of blood were shed with a view of allaying inflammation, and pounds of calomel were employed, as combining all the qualities of an antiphlogistic, cholagogue, cathartic and health-insuring alterative. For the philosophy of this system of practice, I must refer you to those who still adhere to the same measures under the circumstances which were formerly supposed to attend this disorder; for the success of such treatment, I refer to the statistics of yellow fever as recorded in the books. If a

different mode of practice had not exhibited more encouraging results, I should feel that very little hope or reliance can be placed on medical experience, in a disease of such fearful mortality. But different and more favorable results have been attained. Just in proportion as old-school practitioners have modified or abandoned their depletory, paralyzing efforts, have they presented less horrible bills of mortality; and wherever a rational mode of medication, similar to that which I am about to detail, has been employed, the results, I am assured, have been highly satisfactory. I have already told you that I never saw this disease, where it prevailed either as an epidemic or endemic; but I have met with isolated cases, of what I called congestive fever, which exhibited the prominent symptoms of genuine yellow fever, even to the yellow skin and dark ejection from the stomach, answering well to the descriptions of black vomit. And I have found cases of this gravity yield under the treatment I shall describe.

In the early stage of an attack, while the symptoms are still so indefinite as to prevent the formation of a satisfactory diagnosis, though yellow fever may be suspected, the case should be treated in all respects, as regards medicines, as an attack of malarial or bilious fever. If there is derangement of the stomach, a gentle emetic will be proper. This will remove any irritating substances from the stomach, and prepare for the more efficient exhibition of other medicines; it will rouse the nervous system from the lethargy into which it sinks in this form of disease; promote, mechanically at least, the action of the liver; and have a potent influence in determining the blood to the surface, and thus restoring the capillary circulation. I should even be more certain to give an emetic in such a case, than if yellow fever were not apprehended; for bear in mind, that should it prove to be this disease, a very brief time may be allowed in which medicines can be of any avail; and where time is so important, an emetic is peculiarly adapted to our purpose, from the little time required for its operation. Half an hour is generally ample time for accomplishing all that can be done with an emetic. The choice of an agent to be employed for this purpose is important. It should be prompt and thorough in its action, and at the same time mild and easy in its operation, and unirritating to the mucous membrane. These properties are combined in the *lobelia inflata*; and the calm, quiet condition of the stomach, which uniformly follows its operation, renders it, in my judgment, the very best article we possess for a case of this

kind. The action of the lobelia is very much improved by combining it with eupatorium perfoliatum. A saturated infusion of equal parts of these two herbs may be given, in doses of two table-spoonfuls every ten minutes, until a sufficient emesis is effected.

The febrile stage requires thorough bathing with broke water and whisky over the entire surface, with friction by rubbing with a towel or the hand. Extensive sinapisms should at the same time be applied along the spine, and to the epigastrium. These tend to divert irritation from the nervous system and stomach. Warm teas, such as catnip and balm, are highly useful, as they tend to encourage perspiration and thus diminish febrile action. In short, pursue in this stage a soothing mode of treatment, calculated to allay febrile excitement, equalize the circulation, and relieve any local congestion which may exist. And let it be always borne in mind, that what is done must be done with dispatch, and efficiently. The physician should if possible see his prescriptions administered, and witness their effect. Do not if you can avoid it, leave your patient in these malignant cases, and trust to an ignorant nurse to carry out your orders. Immediately upon the decline of fever, or before, if the symptoms denote urgency, administer the medicines which I have denominated antiperiodic. For here you have a malarial fever, depending principally upon the same cause which produces periodic fevers; modified by combination with a depressing influence, which prevents, it may be, any tendency to remission; but which must certainly be amenable, to a great extent, to the same remedies as are intermittent and remittent fevers. And here I do not rely on theory alone in recommending this antiperiodic treatment. For it has been tested with the most gratifying results by those who have had the opportunity. In New Orleans, it was first introduced in the epidemic of 1841, by assistant surgeon Charles McCormick, and Dr. A. J. Wedderburn, and has been since extensively employed. "The practice of giving large doses of quinia very early in the disease, is asserted by some to have been attended with great success," says Dr. Wood in his Practice, Vol. I., page 308. Other authorities might be quoted to the same effect, but this is sufficient to show that the treatment called for by my views of the cause and nature of this disease, proves efficient in actual practice, whatever may be considered the particular ground for its exhibition. The remedy does not fail when administered in a proper manner, even though the practitioner's theory may be erroneous. Quinia has done

much good in thousands of cases when given under the name of a tonic, though its real pathogenetic action is certainly that of a sedative. Having therefore my own experience in the use of the antiperiodic medicine, in cases which seem to approximate very nearly to the character of yellow fever, and finding it successful in the treatment of that very disease in the hands of others, I do with the utmost confidence, advise you all to employ it when opportunity shall offer.

The sulphate of quinia should be given in doses of six or eight grains, with equal quantity of prussiate of iron; or if the latter disagree with the stomach, it may be omitted. I have recently found much advantage in inflammatory diseases by combining tannic acid with the quinia. The astringent property of the tannic acid has, I believe, a beneficial effect in repressing inflammatory action in the mucous membrane. Another advantage of the combination consists in the fact that the tannic acid renders the quinia almost tasteless. The bitterness of the quinia seems to be removed, either by a chemical combination, or by the astringent effect of the tannic acid rendering the surface of the tongue in a measure insensible. The latter, I am inclined to believe, is the true explanation. The quinia thus combined, or alone, as suits the views of the physician at the time, should be repeated at suitable intervals, until its full effect upon the system is realized; and you need apprehend no injury from its administration, in view of any symptoms the case may present. These, with the various accessory measures which I have so often recommended in other grave forms of fever, would be the means I should adopt, if called upon to treat the disease.

I have said nothing as yet of cathartics in this affection. I believe they have been far too frequently employed, under the erroneous notions which have been entertained of the cause and nature of yellow fever. Why should we give a cathartic? Does the diseased action indicate such a measure? If there were evidently accumulations in the bowels, I should favor their expulsion by a mild cathartic. But upon general principles, I see no call for catharticism in this disease. If the bowels are irritated, why increase the difficulty? If the bowels are healthy, why originate mucous irritation by purgative medicines? It is in this very way, I am confident, that untold mischief is done in this and other disorders, by mercurial preparations. The liver in the beginning of the attack is generally active. But the disease indicates a cathar-

tic, say the books, and the best cathartic is calomel. This is accordingly given liberally, and followed in three or four hours by a saline cathartic. The mucous membrane of the stomach and intestines, especially the duodenum, has now suffered violence, which results in irritation,—perhaps inflammation. The difficulty is extended by sympathy to the liver, and that organ is locked up, and then follows all the train of symptoms incident to hepatic disease.

But gentlemen, the reign of mercury as the sovereign remedy is waning, and indications at present point to its ultimate banishment from the commonwealth of physic. Even the old-school authorities of recent date manifest distrust of this most potent drug, which a short time ago seemed to be the one thing needful, not only in yellow fever, but in almost all diseases. It was the catholicon, the panacea, the physician's staff in all his difficulties, the patient's hope in the valley of despair; the means first tried as disease approached, in hope by potent doses to frighten it away; and then when strength was gone and aggravated complications had been induced, the last resort and only hope consisted in the possibility of substituting mercurial for other disease, so that if the patient must be lost, his death might be accomplished by scientific means. But such times, I trust, are nearly passed, and a brighter day has dawned upon us. True, mercury still has apologists, but their tone is much modified, and where the agent is directed it is apt to be coupled with a contingency, such as, "if calomel is employed," or "it will be necessary that the practitioner should decide, at a very early period, whether he will have recourse to mercury in the treatment of this disease." Men cling with great tenacity to old favorites, and often expressed opinions are seldom unequivocally renounced; but it is encouraging to know that prejudices sometimes die with the men who cherish them, and much is to be hoped from the next generation of medical men.

The lancet too, is losing its hold on the confidence of the profession, not only in yellow fever, but in various other affections, for the arrest of which it was formerly deemed indispensable. Recommendations of its use are now associated with solemn warnings of danger, and with intimations that little is to be expected from blood-letting as a means of cure. "The question," says Prof. Wood, "must be decided at an early period, whether it will be requisite to use the lancet." "It is generally considered a hazardous remedy after the lapse of one or two days. Bleeding will not

cure the disease, nor should it be vaguely employed with this view." Subsequently, speaking of prevention, he says, "attempts to guard against the disease by low diet, bleeding and purging, or the use of mercury, are futile, and even worse than futile. The feebler the system, the less is it able to resist the entrance of the poison or its influence when absorbed." Please observe these quotations, gentlemen: "bleeding will not cure"—it will not prevent. [Is not the question "decided" before-hand, if these assertions be true? S.] In all sobriety I would then ask, for what purpose we should resort to so hazardous and so useless a remedy. But such is the truth, and such is the doctrine for which, as a medical school, we have so long contended. "The feebler the system, the less is it able to resist the entrance of the poison, or its influence when absorbed." This doctrine, gentlemen, is unmitigated Eclecticism—which when applied to other measures and diseases, is as certainly true as when advanced in relation to the lancet in yellow fever, and a consistent adherence to it will terminate the blood-letting epoch, and will introduce fully the reform for which we are struggling, and for which the world is well nigh prepared.

Should you first see a patient in the period of prostration, the quinia must not be delayed a moment. Its introduction should be prompt, in full doses, and its retention by the stomach favored by anodynes, carminatives, or stimulants, as the case may require. Oil of turpentine and capsicum combined with quinia has been recommended, and the prescription strikes me as one well adapted to the case. Let the strength of the patient be sustained by every means that can be employed. Mild nutriment, such as gruel and weak animal broths, bread-water, or milk and water, as the stomach can be induced to retain them, are important means for this object. Sinapisms, as recommended in the former stages, are equally important now, and even a blister over the stomach might be of much service by its prompt revulsive influence. The circulation should be invited to the extremities by draughts on the wrists and ankles, and stimulating frictions should be used over the whole surface.

Should you be so fortunate as to induce a reaction, and get your patient into a convalescent condition,—and I confidently believe you will do so in a majority of cases where you are called at an early period of the attack,—you will then have the general principles for your rule, which govern in the management of convalescence from all depressing fevers. Husband carefully the remaining strength, employ proper tonics, and allow wholesome,

digestible food, increasing the quantity gradually as the patient gains strength. Let moderate exercise be taken within doors, or in the open air, where there is no exposure to infection. And here I will say, that wherever it is practicable, I should be in favor of removing every patient at once to a healthy location, as the chances of recovery are thereby greatly increased.

There is one more point in connection with this pestilence, upon which I desire to make a remark or two, and that is, the means of prevention; for in this case the old adage is emphatically true,—“an ounce of prevention is worth a pound of cure.” Public authorities should see that general cleanliness is observed by the whole community. All ponds should be drained, where deposits of vegetable or animal matter are liable to collect and be left to decompose. Sewers should be provided to carry off the filth of the city, and the back yards and cellars should be duly inspected, together with every other place where miasm is likely to be generated.

During the prevalence of the disease, all who can should leave and avoid the infected district. Those who can not avoid exposure to the cause by removal, should avoid the night air, and sudden changes of temperature; they should sleep in the highest part of the house; be moderate in taking exercise, avoiding fatigue and mental excitement; their food should be generous and nutritious, though not stimulating, and they should never expose themselves to infected air with the stomach empty, or when the system is exhausted by labor or loss of sleep.

[The late Prof. Morrow treated a case, which was landed at Cincinnati from a steamer on its passage up the river from New Orleans, in the following manner: he commenced by rubbing the surface briskly for an hour or two with flannel cloths saturated with weak ley and whisky made very warm, with a view to restore the equilibrium of the circulation. At the same time he applied a large sinapism to the abdomen, and when it was removed followed it with bitter herb fomentations, applied hot and frequently renewed. He also applied mustard to the inside of the thighs and to the soles of the feet, and had the patient drink freely of warm peppermint and catnip tea. This treatment he found to afford considerable relief, by restoring the action of the skin and diminishing the oppression and excitability of the stomach. He then gave podophyllum and compound powder of jalap to the extent of producing very thorough catharsis. His reliance in subsequent

treatment of the case was in the use of tonics, mild diaphoretics and aperients. The patient speedily recovered.

I can not perhaps do better than to introduce a statement of the treatment of two Eclectic physicians as reported by themselves, and which appears to have been remarkably successful as I have learned not only from themselves but through other sources. D. McVoy, M. D., of Mobile, Alabama, in an article published in the Mobile Evening News, 1854, and republished in the Eclectic Medical Journal, Jan., 1855, after giving a general description of yellow fever as it prevailed in that city in 1853, and a brief statement of the treatment generally pursued, says:

"The last mode of treatment we shall notice is the Eclectic. In this, not only venesection, but mercury in all its forms, as well as antimony, are entirely excluded. The treatment, by a physician of this school, is premised with a thorough mustard bath, after which an emetic, provided the disease is in the early or forming stage. When an emetic was deemed proper, the following was used: ipecac. 8 grains, lobelia 12 grains, sanguinaria 6 grains, capsicum 2 grains, given at one dose, and repeated every ten minutes till free emesis took place.

"After the operation of the emetic, or when omitted, the following was given: podophyllin $1\frac{1}{2}$ grains, leptandrin 5 grains, cream tartar 30 grains, to be repeated in four or six hours, if catharsis did not follow the first dose, which it rarely failed to do, producing a marked amelioration of all the symptoms, when the following dose was immediately administered: quinia 8 to 10 grains, tincture of gelsemium 30 to 50 drops, in half a wineglassful of water, and repeated every three hours till three doses were given. In many cases, however, the stomach would not tolerate quinia, when 15 grains of salacin were substituted. If the disease did not yield to this first course, the podophyllin and leptandrin were exhibited in alterative doses, every hour or half-hour, till the functions of the liver were restored; the tonic course was then repeated, and with entire success.

"The writer preferred to omit emetics, and commenced the treatment with, podophyllin 1 gr., leptandrin 3 grs., ext. butternut 6 to 8 grs., extract taraxaci 10 grs., made into four pills. These four pills were given as the first thing, without regard to the state of the stomach; if rejected, they were repeated. The entire surface was then sponged with an alkaline mixture, consisting of saleratus or ley and warm water, every two or three hours; no

mustard was used in any manner. This, with suitable drinks, constituted the treatment for the first twelve hours, when a remission, sometimes well marked and again obscure, occurred, perhaps the effect of the first cathartic dose. There was generally cutaneous relaxation, the pains were mitigated, and the patient felt in some degree relieved. This was the moment for the successful exhibition of quinia. In no case has it been attempted to allay vomiting by direct means, except by this first dose, which, for a short time, increased rather than diminished the nausea, and occasionally produced vomiting, and, in from four to six hours, catharsis; the object being rather to remove a pathological condition than to quiet its effects, and this was usually the result. When the period of remission came on, in about twelve hours, the pills having acted, we administered sulphate of quinia 10 grains, elixir vitriol sufficient to dissolve it, tinct. gelsemium 30 drops, sirup 1 ounce, to be taken at one dose; or, the gelsemium might be given alone, and the quinia combined with prussiate of iron 3 grains or more.

"We generally found the patient convalescent the next day, and very seldom had recourse to stimulants; when indicated, they were given in quantities just sufficient to impart tone to the vital powers, and then withdrawn. Where a case proved obstinate a modification of the same treatment was attended with success. When quinia was not admissible, we substituted salacin with equally happy results.

"We are no advocates for large doses of quinia, seeing that 10 grains administered at the right time, are equal in power to 30 or 60 grains.

"We object to the use of brandy, wine, porter, ale, port and champagne, on the ground that these are more or less adulterated and drugged. Port wine and champagne are never genuine—the affirmative would seem impossible; hence, we give the preference to pure alcohol, obtained from the druggists.

"As drinks we advised water gruel, rice, or barley water, teas made of slippery elm, sweet bay, etc., decoction of sumach berries, lemonade; acid and saline drinks we regarded quite important.

"Further experience in the use of these new remedies has suggested some improvement in the treatment of yellow fever, which we, this season, find attended with good results, having lost no case, and but one in the city (Mobile) last year, and this case was one of relapse."

C. H. Thomas, M. D., of Cincinnati, went to Norfolk, Virginia, during the prevalence of the epidemic of 1855, and engaged actively in the treatment of the disease. The following are extracts from an article of his, published in the *Eclectic Med. Jour.*, Dec., 1855. Dr. T. had not previously, I believe, had much experience with Eclectic remedies, and as will be seen combined a mercurial with some of them, but in conversations which I have had with him he attributes the success of his treatment to the efficiency of the other agents employed. After speaking of several causes that contributed to the fatality of the disease, he says:

"And there was still another difficulty in the way of success, viz: physicians were not in possession of the *best* medicines for yellow fever (or any other fever). Calomel, for instance, is not the medicine for this disease. I discovered that all patients medicated with calomel became very much emaciated, and convalesced (when at all) exceedingly slow, and the stage of excitement lasted from sixty to eighty hours, instead of twelve to eighteen, as when treated with podophyllin and leptandrin instead. This matter I tested fairly, and without prejudice one way or the other. I went there to do the very best I could for the poor sufferers of those cities; and I found, by actual experiment after I got there, that the *best* way was not to use calomel. * * *

"I will now endeavor to give my *plan of treatment*, or at least a synopsis of it. * * My first advice, when called to a patient, was a hot foot-bath made very strong with ground mustard—the feet to be kept in the water as hot as possible, with blankets or comfortables wrapped about the patient, tub and all, for about five minutes; then to be put to bed, and blankets, comforts or feather beds enough over him to produce very free perspiration—the more the better. To assist in this matter, I gave warm catnip, balm or sage tea to drink as freely as the stomach would bear; and as soon as perspiration was established, I gave the following:

℞. Podophyllin, gr. ss. to jss.

Leptandrin, gr. ij. to v.

Hyd. cum. cretâ.

Potassæ bitart, ãã. gr. v. to x. M.

One dose (for adults). The amount was varied, according to idiosyncrasies, etc.

"After this dose was taken the patient was advised to keep as quiet as possible (to prevent nausea), and to drink nothing but a

little sour lemonade occasionally, until the medicine had the desired effect upon the bowels, which was usually in about four hours—sometimes five and six. After the operation of the medicine, and as often as every three or four hours, for at least two days, I had the entire surface sponged with saleratus and water—cold water when the skin was hot, and warm water when the skin was not hot.

“The symptoms and indications were watched, and medicated accordingly, after the operation of the above dose, until the ‘*remission*,’ which generally manifested itself in from twelve to fourteen hours after this dose was taken. This was the time, and the *only* time, for the administration of tonics. This is the *desideratum* in the treatment of yellow fever. Give your tonic before or after this particular time, and the chances are ten to one against you. It requires close discrimination to detect this most desirable change in this singular fever. So much so, that the physicians in Portsmouth told me when I went there, that there was no such thing as ‘*remission*’ in the disease; that they had watched for it, but to no avail; and told me if I found one, they would like to hear from me, etc. In view of this fact, they would administer quinia indiscriminately, and do but little good, and if the patient was not able to endure disease, bad treatment and all, he would surely die.

“I used for tonic the following:

R. Sulph. quinia, gr. x. to xv.

Elixir vitriol, gtt. xxx. to xl.

Sirup lemon, ℥j.

Tinct. gelseminum, gtt. xxx. to l. M.

One dose (for an adult). Tinc. gelseminum continued at intervals of two to three hours, until three or four doses more were taken, diluted with about a large spoonful of lemonade. Dose as above.

“After this the treatment became promiscuous. The stomach and kidneys required close watching, to prevent too much irritation, and suppression of urine. For the former I had frequently to vesicate, and give creosote.

R. Creosote, gtt. x to xx.

Mucilage gum Arabic, ℥j. M.

Dose, one teaspoonful when the stomach was sick, and *no water*, notwithstanding the patient would crave it more than life itself. For derangement of the kidneys I used spt. nitri. dulc., spt. Min-

dereri, uva ursi tea, etc., internally, and spt. turpentine and sweet oil, equal parts, to the back and abdomen.

“Emetics and drastic cathartics were contra-indicated at all times. In fact, no purging at all, after the first dose, is required. Simple aperients, if the bowels are not open once a day, may be used. Chicken water and lemonade for nourishment and drink. When stimulants were indicated, I used pale ale, or the best port-wine I could get, and sponged the surface with brandy and water.”

Dr. T. is confident that the yellow fever during the epidemic in which he saw it was propagated by a virulent contagion. S.]

LECTURE XIII.

MALARIAL FEVERS—CONTINUED.

Typhoid Fever: Preliminary Remarks; Synonyms; Mode of Invasion; Febrile Symptoms; Different Periods of Progress described; Sometimes Periodic; Tympanites; Peculiar Discharges; Rose-colored Eruption; Sudamina; Petechiæ; Subsultus Tendinum; Posture of Patient; Fatal Cases—Mode of Death; Duration; Favorable Result; Convalescence; Sequelæ; Anatomical Phenomena—Characteristic and Occasional, Lungs, Brain, Alimentary Canal—Peyer's Glands, Mucous Membrane—Spleen—Liver.

TYPHOID OR CONTINUED FEVER.

We come now to speak of a variety of fever having distinct and well-defined characteristics, differing in many respects from any of the forms we have hitherto considered, and worthy of deliberate attention and thorough investigation. I mean *typhoid fever*.

This fever has perhaps been the subject of as much careful and calm discussion and recondite investigation, and has been observed with as close scrutiny in its entire train of phenomena, as any other disease to which the profession has given attention; yet there are many things connected with it still veiled in obscurity, and requiring further research and observation.

In regard to the name of the disease, I remark that I use the term *typhoid fever* for want of a better. It is the title by which the disease is described in most of the recent authorities, but it is not descriptive of the nature of the disease, nor expressive of its cause. In fact there is some objection to the term *typhoid* as applied to this particular disease, from the tendency which exists to refer to the original word *typhus*, as denoting the same disease. Now, although *typhoid* is an adjective derived from the noun *typhus*, and when applied to a low condition such as sometimes attends protracted fevers, expresses the idea that the symptoms are similar to those of *typhus fever*—they are “*typhoid symptoms*”—

that is, symptoms resembling those of typhus—yet the term when employed as the name of the specific disease now under consideration, loses in a degree its descriptive character, and becomes an arbitrary name. You will please therefore remember the distinction between typhus and typhoid. By typhus fever, I mean that modification of bilious which I have elsewhere denominated congestive fever; by typhoid fever, I refer to a distinct and very different disorder, originating in a different cause, and presenting, for the most part, symptoms of a different character. The name typhus has I believe been applied to this disease in New England, where the true typhus does not prevail; but those who have had experience in both fevers, will have little difficulty in distinguishing between them. The researches of M. Louis and other European writers, have very satisfactorily determined the character of this disease; and the term typhoid is preferred by them, and adopted by most American authors; while Ware, Jackson, Hale, Gerhard, and others, have in various observations, made at different times and in different parts of the Eastern States, fully shown the identity of the typhus of those sections and the typhoid of Louis and others.

This disease has been called *nervous fever* by some authors, from the symptoms of nervous disorder which attend it; some French writers call it *entero-mesenteric* because the intestines are always found diseased in fatal cases; and Brentonneau calls it *dothin enteritis* (from *δοθην*, pustule, *εντερον*, intestine), to denote the character of the intestinal affection; *follicular enteritis* has been applied to it for the same reason; Prof. Wood proposes the term *enteric fever*, but this might cause it to be confounded with other forms of gastro-intestinal inflammation; some still adhere to the old name of *continued fever*. These numerous efforts to furnish a suitable name, while they are somewhat interesting, as they indicate in some measure the character of the fever in question, have certainly resulted in considerable confusion; to avoid which and to avoid also the fault of authors in furnishing a name of my own devising, I shall designate the disease by the term first mentioned, with the express understanding that I use it rather as an arbitrary cognomen, than as a descriptive appellation, although this disease is attended with many symptoms similar to those of typhus or low congestive fever.

The invasion of the system by typhoid fever is remarkably insidious. Few diseases are so slow in their approach; its inroads

being at first almost imperceptible. So gradually does the morbid influence develop itself, that patients are frequently unable to say when they first began to be unwell. The period of invasion varies in duration from a day or two to as many weeks. Perhaps the average length of time occupied by what may be called the premonitory symptoms, is about six days. It is said by some authors that the disease sometimes comes on suddenly, with a chill followed by fever. Of this I have doubts, for I am inclined to believe that practitioners have been accustomed to mistake low forms of bilious fever, coming on with a chill and finally developing typhoid symptoms, for this disease. I myself have seen cases which might easily have misled one who was not on the alert. The question with me formerly was, indeed, whether typhoid fever itself might not be regarded as a peculiar modification of one of the ordinary forms of fever, owing to enteric disease; though more recent observations have satisfied me that we have a form of disease requiring an independent and distinct position in the catalogue of fevers, and this is the one to which I apply the term typhoid fever; but I repeat, that it is very doubtful whether it is ever introduced suddenly by chill and fever.

Its mode of approach does however vary in different cases. In some the symptoms are palpable and characteristic, almost from the first, while in others they are indefinite and inappreciable for some time, the patient feeling weary, listless, and dull, with an indistinct soreness in the limbs: finally he begins to "feel unwell," a headache comes on, the skin becomes hot by spells, with alternate chilly sensations. Where the disease comes on more rapidly, these same sensations are experienced earlier, and, instead of an undefined listlessness, there is a feeling of fatigue and even debility; there is a disinclination to walk, or take other exercise; the limbs feel sore, and often there is actual lameness. The appetite fails, partially or altogether, so that if food is taken, it is not relished as usual. Sometimes the appearance of food of the best quality will produce nausea. The bowels are perhaps slightly constipated, or there may be a tendency to diarrhea, not sufficient however to be recognized as disease. The skin becomes dry, flashes of heat are experienced, the pulse is accelerated, the head aches, and a creeping, chilly sensation is occasionally felt along the back, passing off in a moment, and followed by a glow of heat. In a short time another chilly sensation will be felt, followed by heat as before. While these symptoms are progressing, the patient often feels very

restless and irritable, though this feeling is not so prominent here as in remittent fever. The tongue is but slightly coated, if at all, whereas in bilious fever there is usually a heavy coat upon it.

The disease is now fairly commenced. The febrile symptoms continue; the pulse becomes more excited and frequent—not full and bounding as in remittent fever, but hard, wiry, quick and frequent. The bowels do not yet perhaps manifest positive disease; there are probably loose discharges—not watery nor very frequent, but two or three motions of the bowels during the day. The urine is not generally so scanty nor so high-colored as in most other fevers, though it becomes more so as the disease progresses. The bowels are peculiarly sensitive to the action of medicines, requiring perhaps less than an ordinary dose to produce hypercatharsis—and this is an important fact to be borne in mind during the treatment. The skin, at this stage of the disease, becomes sensibly more dry and harsh. There is not a decided pungency on application of the hand, as in congestive fever, though there is a palpable increase of temperature on the body. Headache is still a prominent symptom in most cases, and sometimes is the principle subject of complaint. This symptom differs much in different persons, but is very seldom entirely absent. Thirst is an early symptom, and is frequently extremely urgent, especially under mercurial treatment. This circumstance was the occasion of dreadful suffering, in early times, yet within my recollection, when the use of water was forbidden as incompatible with that of mercury; but fortunately this barbarous practice has been suspended; not, I apprehend, from considerations of science, but of expediency.

The face of the patient is usually flushed and shining, though less so than in congestive fever. The skin assumes a dusky hue, and there is a dull or obtuse expression of the countenance, increasing as the disease advances. The tongue is not yet much coated, though a fur may make its appearance, with perhaps redness of the tip and edges of the organ. The stomach sometimes becomes irritable, if it has not been so before, and the tendency to disturbance of the bowels is generally increased. Pain may be felt in the bowels, which is increased by pressure on the lower portion, especially on the right side, and generally a tympanitic condition of the abdomen is perceived on percussion. The irritated condition of the skin and mucous membranes is often extended to the bronchia, and a cough sets in either dry and hacking or attended with mucus expectoration. This may indeed become a very urgent symptom

and require special attention. In such cases physical exploration will detect a dry, sonorous rale, extending sometimes over the whole chest.

The progress of the disease as thus marked, generally reaches the seventh, eighth, or ninth day from its development. If it occur in an atmosphere where vegetable malaria exists, there is very apt to be, during the early stage, a tendency to remission daily or every alternate day. This it is important to bear in mind, as it will exert a practical influence on your mode of treatment. By remissions here I do not refer to temporary seasons of apparent relief from fever, during which perspiration may perhaps break out upon the forehead, face, and neck. These generally occur frequently every day, at irregular intervals. But I speak now of regular quotidian or tertian revolutions, generally the former, which are denoted by a regular and gradual decline of the febrile symptoms, until a remission more or less perfect is perceived. The remission generally occurs in the morning, the fever rising again toward evening, increasing it may be till midnight, and then again gradually diminishing—marked all the time however, in most cases, by the irregular alternations of which I have spoken.

Although the progress of this fever is so very slow that its victims do not generally regard themselves as much sick for several days after the attack, yet the practiced eye and hand of the physician will soon detect evidences of serious disorder. The peculiar febrile action, the hard, wiry, frequent pulse, the sensitive mucous surfaces—especially of the bowels—all point to serious lesion, not to be hastily removed by remedies now within our knowledge.

These symptoms continue, increased probably in intensity, and others are superadded. The tongue becomes dryer and perhaps somewhat darkened in color in the middle, while the edges and tip continue red; the saliva has a cottony appearance, and the tongue when protruded, seems inclined to curl up at the sides and extremity. The throat is dry and feels sore, and deglutition is painful and difficult in many cases. You will now find the abdomen much distended, and percussion will produce the hollow or tympanitic sound. The looseness of the bowels will probably be increased, and a slight purge would now produce a hypercathartic action, which would continue for several days. Hence, it is evident that such medicines would aggravate the difficulty. The evacuations are now watery in their character in most cases, whether they are the spontaneous production of the diseased bowels, or are

induced by the injudicious administration of a cathartic. They are of a dirty yellow color, resembling a thin, watery gruel in appearance, and the smell is exceedingly offensive. There is one phenomenon often observable in the alvine discharges in typhoid fever, which I have never seen in any other disease, and that is, the existence of small red specks on the surface of the evacuations, having the appearance of little particles of bloody mucus. And now, by examining the skin, you will be pretty certain to find a particular diagnostic symptom, to which I call special attention, for it is peculiar to this fever. I refer to the appearance of small red or purple spots or eruptions, resembling flea-bites. They may be found first perhaps on the abdomen, but extend over the whole body, and especially to the extremities. These eruptive spots constitute the *rose-colored eruption* of some writers, and they are to be recognized by the appearance of circumscribed prominences on the skin, obliterated by pressure, but reappearing shortly after the finger is removed. Accompanying this symptom is often observed another eruption, differing from it essentially in character, though scarcely less diagnostic of the disease. This consists of minute vesicles filled with lymph. These vesicles, called *sudamina*, vary from the size of a millet-seed to that of half a buckshot, and are found principally on the neck and upper part of the chest, sometimes extending to the abdomen, but seldom if ever to the limbs. These vesicles may be easily overlooked, owing to their colorless transparency; but upon applying the hand to the skin, they are easily recognized, being more prominent than the rose-colored eruption, and imparting a peculiar sensation of roughness to the touch, unlike any thing else.

At this stage of the disease, the nervous disorder begins to present more decided symptoms. There is slight delirium, or it may be a tendency to stupor, with tremors and twitchings of the muscles when the patient reaches out his hand. The first indication of delirium which is observed, may probably be an increased brightness of the eyes, which might lead a casual observer to suppose the patient is much improved: but very soon signs of mental hallucination are evinced by his motions or language. I have said that there may be a tendency to stupor, but generally the opposite is the case; the patient is wakeful and very restless. There is a buzzing sound in the ears, which may be compared to the rushing of a current of water, similar to the sensation produced by full doses of quinia. The eyes become injected and somewhat red in

appearance, with a vacant stare, and the patient seems to have an imperfect perception of objects, though on first looking at him, you would suppose his eyes were unusually clear and bright. The tongue can with difficulty be put out of the mouth, and it may be observed to have a trembling motion. This difficulty of motion is not owing, as in typhus or congestive fever, to a swelled and cracked condition of the tongue, but to an inability to direct or control the muscular actions by the will. This inability in fact extends in some measure to every other muscle, as is manifest when the patient attempts to change his position, or use his limbs.

The symptoms just described continue through several days, in some cases, increasing more rapidly than in others, but generally with a steady advance in the morbid manifestations, until the *typhoid* condition is fully presented. Now the patient lies perhaps in a partially comatose condition, if undisturbed; though he may be aroused without much difficulty. His mouth is kept open, and his breathing is heavy and laborious. A peculiar dark deposit, called *sordes*, appears upon the teeth, and sometimes on the lips; and by breathing constantly through the mouth the moisture is carried off and the tongue left in a dry, parched condition, somewhat resembling its appearance in congestive fever; but close inspection will enable you to perceive that this dry state of the tongue is not owing to an irritated or inflamed condition of the organ, but merely to the evaporation caused by the breath passing over it. The pulse is generally very frequent at this stage of the disease, though there is much variety in this respect in different cases. It may be as low as 85 per minute, or it may reach 150; and the gravity of the disorder may perhaps be regarded as being more or less serious, in proportion to the frequency of the pulse. It is generally not only frequent, but very feeble; though it may still retain a hard, corded character. There is still a hot skin, though this may not be uniform; some portions of the surface may be hot and others cool. The heat here is somewhat pungent, but less so than in congestive fever; and there is a peculiar odor arising from the body and perceived in the breath, which is very unpleasant and difficult of description, though it is readily recognized by one who is accustomed to the disease. It is not so offensive and nauseating as the odor which characterizes the last stage of congestive fever, but it is very disagreeable and sickening. *Subsultus tendinum* is generally witnessed in connection with the symptoms now described. This is the trembling of the muscles,

small blister at the point where pressure is long continued; this will be extended, the surface will become raw, and owing to the want of vital force, there will be a tendency to gangrene, and the skin may entirely slough away, leaving the process of bone exposed. I have seen a case where a slough came off as large as my hand, and so deep as to expose the vertebral spinous processes, and yet the patient recovered.

If the disease progress, with an increase of these symptoms, the case must soon become very formidable. The pulse loses its remaining force and becomes hurried, perhaps fluttering; or it may become very slow and weak, and occasionally disappear from the wrist. A clammy sweat covers the skin, the extremities become cold, and death steals upon his victim as slyly and insensibly as did the disease in its first approach. Sometimes however, the vital forces give way more suddenly, and the patient dies with agonizing struggles.

Such is the usual course of a fatal case of typhoid fever. As has been remarked, the course frequently varies, the symptoms do not appear in the same order, nor with the same relative degree of malignancy in some cases as in others. The duration too, is quite variable; for though the disease is usually slow in running its course, yet cases are spoken of in the books, where death occurred as early as the sixth or seventh day. It generally occurs however, during the second or third week, though it may be deferred much longer.

Where a case is to terminate favorably, a moderation of some of the symptoms will be observed, generally during the second or third week. The tongue will appear more moist, and the coat upon it will be gradually removed; the pulse will improve, become less frequent, and acquire more volume; the skin will assume a more natural appearance, and cooler temperature; the nervous symptoms will diminish, the mind of the patient become clearer, and he will manifest greater interest in his own case, and observe more intelligently what is transacted about him; the tension of the abdomen will become gradually lessened; the dejections will present a more healthy appearance and less offensive smell; the thirst will be less urgent, and some desire for food may be expressed,—or a willingness at least may be manifested to take it when offered. In short, there will be a general but very gradual resolution of all the morbid conditions, and the restoration by degrees of the various organs involved, to their healthy functions. But these

recuperative changes progress slowly, and convalescence is usually tedious; requiring from five to six days, in a very mild case, to as many weeks, where the attack has been very severe, and the organic lesions extensive.

The beginning of convalescence is however generally more tedious than its subsequent progress. Indeed it often happens that after the patient becomes able to take nutriment, and the processes of digestion and assimilation are commenced, and he begins to use his limbs in moving about, his recovery is remarkably rapid. Sometimes however, there is an acquisition of flesh beyond that of strength, and the patient feels a considerable degree of debility, while his appearance indicates full flesh, or perhaps a bloated condition. The appetite is sometimes insatiable, and its indulgence may lead to a fatal relapse. Where the course of the disease has been very severe or protracted, or where injudicious treatment, such as bleeding or mercurial ptyalism, has produced great prostration of the powers of life, and an impoverished condition, both of the blood and solid tissues, a long train of unhappy and discouraging symptoms may haunt the unfortunate patient for weeks or even months. Symptoms similar to hectic fever; night-sweats; depressing nervous disturbance; anasarca, or an edematous condition of the legs and feet; annoying and tedious abscesses; loss of the hair; and other unpleasant sequelæ, may follow.

The *anatomical phenomena* developed by post-mortem examinations next claim our attention. Chomel divides the morbid appearances into *constant* or *characteristic*, and *occasional* or *accidental*. Perhaps no other disease has given rise to as many post-mortem explorations as typhoid fever. Having prevailed in some places to a great extent, and in some localities and especially under certain modes of treatment, proved very fatal, the profession have not been at a loss for opportunities to make autopsic researches as to its morbid phenomena. It has formed a subject of careful and critical investigation for the most intellectual and learned men in our profession. While local phenomena were supposed to demand paramount consideration in determining the nature of any disease, and consequently the minutest changes in any of the organs were matters of very great interest, observations of this kind were prosecuted with commendable zeal; and volumes have been written, article after article published, medical minds and hands and eyes have been actively engaged throughout the world, or at least

wherever this disease has made its appearance, for the purpose of developing its character and learning from its foot-prints something of its origin and course; and one would suppose the subject must now be perfectly elucidated. But such is not the fact; many points still remain in obscurity, and the main object of research,—the cause of the disorder,—is still a subject of doubt and controversy.


It is said by Louis, whose labors had thrown more light upon the subject than those of any other man, that in half the cases of death from typhoid fever examined by him, the heart was softened and diminished in volume; but this I do not regard as a peculiar mark of this disease, but a condition common to low and protracted forms of fever. Another circumstance not peculiar to typhoid, but frequently observed in connection with it, is a fibrinous structure in the heart and aorta. I referred to this in a former lecture, and only mention it here in passing. I will add however, that I have seen this structure three or four inches long, and entirely closing up the aorta. It is said that blood drawn from the arm during life does not present the buffy coat and cupped appearance considered pathognomonic of inflammation, unless there be a complication of some inflammatory affection with the main disease. Its autopsic and chemical examination after death has furnished little or no information of value. It is said to be deficient in fibrin, and it is thought that this diminution is in proportion to the severity of the symptoms. While speaking of the blood, I will take occasion to remark, that there are some important and stubborn facts which go to show that the buffy coat does not necessarily indicate inflammation. Hamilton says, the blood from a patient under the influence of mercury has the buffy coat; and yet who ever ascribed inflammation to mercurial action? Is it not declared to be peculiarly antiphlogistic? Until the relation of the peculiarities of the blood to morbid action during life shall be a little more definitely ascertained, little reliance can be placed upon its post-mortem condition.

The *lungs* have often been found diseased, but there are few if any members of the profession who believe that disease of these organs bears any special relation to typhoid fever. The most frequent morbid condition of the lungs, following this fever, is that which has been described by Louis, as resembling, in color and appearance, the natural condition of the spleen, and named by him *splenization*. The propriety of this description is however, disputed,

as the color of the lungs is not like that of the spleen, but is a "bluish red." The affected portion of the lungs has a specific gravity greater than water, and when cut there is an effusion of a thick, red fluid. The lower and posterior portion of the lungs are most frequently involved,—owing probably in some measure, to the influence of position. The mucous membrane of the air-passages is also occasionally found in a diseased condition, exhibiting considerable traces of vascular engorgement, and in some instances there is disorganization, extending even to subjacent structures.

Lesions of the *brain*, or of its membranes, from the severity of the symptoms referable to this organ, might readily be supposed to exist. But in this, as in other diseases, we frequently fail of detecting physical changes in this organ, bearing any rational proportion to the symptoms observed in the progress of the fever. This, however, need not produce much surprise, since observation has satisfactorily determined the fact, that extensive functional disturbances do frequently exist for a long time, without any traceable organic change being produced. The knowledge hitherto obtained from post-mortem examinations of the brain, in relation to its diseases, is not in fact as satisfactory as that furnished by similar researches in most other organs of the human system. Future observations, with the advantages of the microscope and of chemical analysis, which modern science enables us to bring to our aid, will it is hoped result in the explanation of many symptoms pertaining to this and kindred diseases. Suffice it to say, that where organic changes are observed at all, the one most common perhaps is an effusion of serum between the arachnoid and *pia mater*, with traces of sanguineous engorgement of the latter membrane, and of the medullary substance; while in rare instances, there may be observed either "an increase or diminution in the consistency of the brain."

Let us now examine the *alimentary canal*. In the *pharynx* and *esophagus*, but especially in the former, traces of organic change are occasionally exhibited: such as cankered or ulcerated points, or sanguineous engorgements. The *stomach* still more frequently presents evidences of morbid action. But these differ greatly in extent in different cases,—from a slight appearance of inflammation, to a general softening of all the organic tissues; from small apthous points in the mucous surface, to extensive ulceration, involving, in some instances, all the coats of the stomach. And it is perhaps worthy of remark, that the structural lesions of this



organ often exceed in extent, the changes we might reasonably anticipate by observing the symptoms of gastric disorder during life. This however is not always the fact, for we often meet with cases where there is great irritability of the stomach, especially in the early stages. In some instances there is even protracted vomiting.

But of all the lesions which post-mortem examinations have revealed, as connected with typhoid fever, none are so uniformly present, or so peculiar in character, as those found to exist in the small intestines. Not only are they constant, but strikingly similar in different cases—varying merely in extent, or by complication; but almost always presenting characteristic peculiarities, believed to have been observed in no other disease.

The contents of the small intestines are somewhat peculiar, though they are not considered pathognomonic. As might have been anticipated from the tympanitic state of the abdomen, during the progress and especially toward the termination of the case, the small intestines are found more or less filled with flatus; while the fluid contents are usually quite thin, mixed with mucus, and of a dirty yellow color; though sometimes the color is more bright, and the appearance is more bilious; and in those cases in which hemorrhage from the bowels had occurred, the color was red, as if stained with blood. Sometimes there is a considerable amount of dark grumous, or coagulated blood.

Independent of the specific local lesion which I shall presently describe, the mucous membrane, throughout a large portion of its extent, is sometimes found more or less injected, or otherwise changed from its healthy state; this injected condition is however more frequently found to exist in separate zones or distinct patches. The morbid action indicated by this red color and altered appearance, has sometimes been so intense and protracted that an extensive softening of the mucous membrane is found to exist. In some protracted cases, the color, instead of being red, has a grayish cast. Sometimes there is a thickened condition of the mucous membrane, with or without a darkened appearance; while in other instances it seems somewhat diminished, and changed in consistence, so as to resemble an unorganized pulp, spread like a layer of paste over the subjacent tissue.

But the lesion to which reference has already been made, and which is believed to be characteristic of this disease alone, consists in the altered condition of those elliptical patches found principally

on the surface of the ileum, and denominated *Peyer's glands*. The abnormal condition of these glandular patches varies in different cases, according to the violence and continuation of the diseased action, and the peculiar constituents or susceptibility of the patients. In some cases there is merely a thickened condition of the elliptical patches, their edges being raised above the surface of the surrounding mucous membrane, with an engorgement of their subjacent cellular tissue. The surface of the raised patches may be smooth, or it may present a granular appearance.

In others, the morbid action has proceeded in such a manner as to produce redness and softening of the mucous membrane and cellular tissue; this is more commonly the condition of those cases which have an early termination. But in a vast majority of cases, in addition to a hypertrophied state of these glandular patches, they are found to be ulcerated to a greater or less extent. The ulcer may be a mere point on the surface of the patch, or it may occupy the fourth, half, or whole of its surface; for in some cases the whole patch is destroyed, and its place occupied by an ulcerated surface, surrounded by a raised edge. All these different conditions may indeed be found in the same intestine; the glands in the upper portion of the tube being least affected, and the lesion being found more and more deeply marked as we pass down toward the ileo-cæcal valve, in the vicinity of which the most numerous and extensive ulcerations are generally found, which sometimes involve the muscular and even the peritoneal coat, resulting in perforation of the bowel and the escape of its contents into the peritoneal cavity. The number of patches in which these pathological changes occur is quite variable, ranging, according to M. Louis and others, from twelve or less to about forty. But the ulcerations are not always confined to the aggregated glands, but those denominated solitary glands are often more or less affected, especially in the lower portion of the ileum. These, by some writers, are called Brunner's glands, but this is erroneous, Brunner's glands being found in or near the duodenum only, while the solitary glands proper are spread over the whole surface of the small intestine.

Changes of the *mucous membrane*, and occasional ulceration of the cæcum and colon, have been observed, in protracted cases.

That persons frequently recover from this disease, after ulceration of the intestine has occurred, there can be no doubt; and it is believed that the lesion in such cases is so completely restored

that not even a visible cicatrix remains, as no such appearance has been detected in the intestines of persons dead from other diseases, and known to have recovered from typhoid fever.

As might be expected, the *mesenteric* glands always exhibit more or less pathological change from typhoid fever. Where death occurs before the end of the third week, the principal peculiarities generally consist in a rosy color, increased size, and softened consistence. In more protracted cases, the volume may be diminished, the consistence less soft, the color changed to a gray, perhaps violet shade; in some cases there are found purulent points containing a yellow deposit. The affection of these glands correspond very nearly, both in extent and degree, with the diseased condition of Peyer's glands. The glands of the meso-colon are generally more or less affected, and so are the lymphatic glands throughout the system; and since the mesenteric, and the lymphatic glands generally, are not often changed from their normal appearance by other acute diseases, their diseased condition may be regarded as, in some measure at least, pathognomonic of typhoid fever.

The *spleen* is nearly always found enlarged, generally softened more or less, and darkened in color. The *liver* is less frequently affected, the most common change being that of softening, with some loss of color. Most generally however, there is little evidence of disease, either in the liver or gall-bladder. The *pancreas*, *salivary glands*, and *urinary* and *sexual* organs are not affected by this disease, except incidentally, as in other fevers.

The more minute and complex phenomena which have been the subject of observation by pathological anatomists, I deem it unnecessary here to detail. I will merely refer you to such writers as Louis, Chomel, Bartlett, Gerhard, and others, for further information on this subject.

LECTURE XIV.

MALARIAL FEVERS—CONTINUED.

Cause of Typhoid Fever ; Doctrine of Contagion considered ; It is Infectious ; Difference between Infection and Contagion ; Influence of Acclimation, Age, and Sex ; Nature of Typhoid ; Diagnosis ; Prognosis ; Treatment ; General Remarks, Dr. Jackson's Method, Chomel's, Louis', Statistics.

TYPHOID FEVER—CONTINUED.

In regard to the *cause of typhoid fever*, a great diversity of opinion is entertained, among the most learned of the profession. Some contend with great earnestness, that it is specifically contagious, and cite instances to sustain their opinion that may seem difficult to explain. Others again, equally entitled to confidence, strenuously insist that their extensive observations establish its non-contagious character beyond a doubt. It has always been a difficult matter to reconcile these apparently conflicting facts, and in view of the fidelity of the statements, made by individuals standing before the world and the profession both unimpeached and unimpeachable, on both sides of the proposition, it may be thought impossible to do it. But in reviewing the whole subject, and examining the arguments and facts adduced by the partizans of both doctrines, I have at length, I think, discovered a satisfactory solution of the difficulty, by which the facts claimed by both are readily explained and reconciled.

From its most general prevalence “where human beings are crowded together with insufficient or unwholesome food, in confined and vitiated air”—such as hospitals and ill-ventilated prisons; the densely populated, crowded, and filthy portions of cities; among the soldiers of large armies, in camps; and in the close and crowded holds of emigrant ships—the generally accredited opinion is, at the present time, with most members of the profession, both contagionists and non-contagionists, that it is caused in some way, by the effluvia arising from the decomposition of animal matter;

or in other words, that it results from a poisonous animal malaria.

This conceded, it does not matter in what this effluvia consists; whether it be in the form of animalculæ, mephitic gas, or animal fungi—either of which will equally explain the facts. But from this statement it will be seen that it may be either a contagious or infectious disease, and the difficulty is not thereby removed. Let us see however, if it can not be reconciled better with one than the other.

The laws of contagion are peculiar, and subject to few exceptions. All those diseases admitted to be contagious have their uniform periods of incubation, or latent periods; their regular rise, progress, and decline, without any considerable variation, unless by some accidental occurrence they are made otherwise; and they are uniformly propagated by exposure. Such it may be said, is the case with all those contagious diseases of which we have any knowledge, and we conclude therefore that these are the laws of contagion. In this definition we include that class of contagious diseases known to be propagated without the necessity of actual contact; making a distinction between those thus communicated and those requiring immediate proximity to the poison to be taken—such as venereal, gonorrhea, itch, etc., which clearly are not subject to the same laws, and I apprehend should not be comprehended in the term contagion, in its ordinary acceptation. These latter diseases, though they may be communicated directly from one person to another, are not governed by those general laws peculiar to the class of contagious diseases of which I am speaking; and I think therefore, should be regarded as propagated by what may be styled *limited* contagion, or perhaps with greater propriety, *local* contagion.

How is it with typhoid fever? Its latent period is irregular and uncertain, varying from twenty-four hours to nearly as many days; and its rise, progress and decline are little more regular or determined than its period of incubation—in some instances continuing from four to six weeks, in others terminating in a few days; and exposure to the disease is not necessary to its propagation, for it often has a spontaneous origin. We conclude therefore, it is incompatible with the known laws of contagion, and hence can not be contagious.

How then it may be asked, can we explain those instances cited by Nathan Smith, M. Gendron, and others—and no doubt similar

instances have been observed by most physicians of any considerable experience and observation — where patients having the disease in full force, have been taken into a healthy atmosphere, where it had not previously prevailed, and from which other cases have arisen. This then is the question, and the only one that can present any difficulty in the way of reconciling its character with the ordinary principles of infection. Let it be remembered that contagion is capable of being communicated directly from one person to another—in other words, some recondite influence is thrown off from the system, in a certain stage of contagious disease, which coming in contact with a system not previously protected, produces a disease of like character. Not so with infection. This though governed by certain laws peculiar to itself, is caused or developed by an influence generated out of the system, and a person exposed to it, and susceptible to its influence, will have a disease similar in all its essential characters, to the diseases of others exposed in like manner. This infectious matter may be furnished by the human system, in health or disease, or by other animal matter, or by vegetable substances undergoing a change by decomposition, and producing an agent capable of developing a disease of a peculiar and specific character, each in its own way and of its own kind. It has already been said that the weight of testimony concedes to typhoid fever an origin from the decomposition of animal matter, or idio-miasmata. Thus a case of typhoid fever, originating from any of those circumstances capable of producing it, and leaving behind all those materials to which vomica can adhere, taken into an atmosphere pure and healthy, may during the continuance of the disease, eliminate from the system animal matter, or some of its elements, in sufficient amount, which when favorably circumstanced, will undergo further change by decomposition, and thus produce or generate a poison of a similar character to that which infected the system first diseased, and in that way propagate the disorder to those about it. Now here is the distinction. The poison generated at certain periods of contagious affections produces, *as eliminated*, or *formed* without any subsequent change of the poison, a similar disease in those exposed to it. The infectious poison on the other hand, requires a combination of circumstances extrinsic to, and in no wise *necessarily* connected with the system thus disordered, for its production; but animal matter in some way must be furnished either after it is thrown off from the system in its diseased condition, or from

others in a healthy state—or it may be furnished from some other source—though most probably eliminated during the existence of organic or functional derangement. In either case however, a subsequent change or decomposition in the matter thus furnished, is necessary to its infectious properties. In this view, typhoid fever is infectious to the same extent that intermittent or remittent fever is, and requires an exposure in a similar way, with this difference only—one is produced by vegetable and the other by animal malaria; the two poisons being no doubt governed, in some respects, by different laws.

In regard to the supposition that the insusceptibility to a second attack affords an objection to its infectious character, I will barely remark, that many other propositions are better determined than the immunity thus claimed. In New England, where I was raised, and where typhoid fever may be almost regarded as endemic, second and third attacks were too frequently witnessed to constitute mere exceptions to a general rule; and I am acquainted with no facts which, in my judgment, show an immunity from second attacks of this disorder, beyond the acknowledged tendency of infections generally to fortify the system which has sustained an attack, against future invasions. The power of different infections probably differs in this respect, but in no case are the exemptions so constant as to establish a law. In fact the apparent prophylactic influence of this class of diseases seems to rest upon the principle of acclimation—a principle so universally recognized that no argument is necessary for its support.

The human system in some cases adapts itself to surrounding circumstances with great facility, but in others with greater tardiness and more difficulty; and though a thorough acclimation does afford protection, more or less reliable, still it can not be presumed to afford sufficient immunity to be considered a law. This protective or prophylactic influence may, as has been already observed, operate in different degrees in different infectious disorders, and probably varies also, in its operations upon individuals of various constitutions and idiosyncrasies; and the very irregular and uncertain protection which appears to follow attacks of typhoid fever, may evidently be attributed to the same principle—the fortifying influence of acclimation.

The period of life at which this disease generally occurs, though in no wise affecting the question in regard to contagion, is nevertheless a subject of much interest; and affords much strength

to the views heretofore explained in regard to the cause of the disease. It can not be questioned, as the statistics of the disease amply show, that its most frequent and general occurrence is at a period of life, when exposures to the cause supposed to produce it are more general and complete. Children it is said under ten or fifteen years of age, rarely have typhoid fever, and persons over the age of thirty-five or forty years, are not often known to be attacked. This accords with what we would reasonably suppose, in view of the idio-miasmatic origin of the disease; for before the first period above mentioned, children are rarely found under those circumstances necessary to the production of the malarial cause. But where they are so exposed, they are not exempt. This accords with my own observations, especially during the last season; for among the children of our common schools, where some hundreds are congregated in one building, and fifty or sixty in a single room, of various ages, from four to sixteen, I have seen a number of cases, having well-defined symptoms of typhoid fever, blended with more or less symptoms of a remittent character; thus showing that childhood is not exempt from mere considerations of age, where surrounding circumstances favor its production. So also it may be said of individuals past the middle age of life, in whom the statistics show a comparative immunity; the cause is not to be found in a positive exemption after that period, but in the fact that persons beyond the age of life referred to, are rarely found in our armies, on board ships, or peopling the hospitals of our maritime marts. These exemptions, it will be found by reference to the statistics on this subject, become more general as age advances, and in this they evidently correspond with the usual exemptions of aged persons from exposure to the cause of the disease.

It is said that the influence of sex has to do in the production of typhoid fever. This however, is variously estimated by different writers; some representing females, and others males, as more frequently subjects of the disease. We may reasonably infer that this difference is owing mainly to the peculiar circumstances connected with these observations, and that little, if any difference exists in the liability of the two sexes. Thus, where the disease was observed in private families, in which females were more exposed by nursing and attendance on those diseased, and in certain factories where females were the principal operatives, physicians have reported its occurrence as more frequent among females; but where the observers were situated in hospitals, and other places in which males bore

a more conspicuous part, during the prevalence of the disease, they have furnished us with statistics showing its greater prevalence among males.

In regard to the nature of typhoid fever, but little need be said—in fact but little of a very satisfactory character can with truth be said in relation to it. From the enteric phenomena, so uniformly presented in fatal cases, it has been supposed by some that these local lesions constituted the essential disease. But its early symptoms clearly imply embarrassment of function, elsewhere located, and in no wise connected with these enteric lesions, manifested at a much later period; and though the local difficulty may be so constant in its connection with the essential and primitive disorder, as to constitute one of its characteristic phenomena, yet the real disease may be looked for elsewhere. Thus the morbid impression may first be made on the great nervous centers, presiding over all the functions of organic life, and be thence reflected upon the particular parts finally involved by reason of a peculiar affinity existing between the specific cause or poison that produced it, and those particular glands. Or more probably, the first morbid influence may be exerted on the blood through the medium of the lungs, and perhaps other organs, and thus contaminate the whole circulating fluid; and the specific affinity of the poisonous elements, as above suggested, might tend to produce this definite local determination. This latter supposition is strongly corroborated, when we consider that the special function of Peyer's glands appears to be the elimination of effete, putrescent or poisonous matters from the blood. The uniform and peculiar local lesions found in typhoid fever, differing in so many respects from the usual appearances attendant upon the ordinary enteric or gastro-enteric affections, leave no doubt that its cause is equally peculiar and specific, and since we know of no direct way in which the original morbid impression is likely to be made upon the parts found involved, it does not conflict with well-established physiological and pathological laws, to suppose the local phenomena may result from a secondary impression. This view accords with what is well ascertained to be the case in many other diseases, and some too, of an infectious character.

This disease can not be regarded as inflammatory in its character; for inflammatory action is always attended by an unusual quantity of fibrin in the blood; while in typhoid fever that element

is generally below the proportionate amount found in healthy blood. Besides, the disease does not exhibit that high grade of symptoms which characterizes inflammation. If it were a disease of a specifically inflammatory character, as supposed by some, it would never be relieved until the specific influence was exhausted, or in other words, until the specific inflammation had run its course, which does not accord with experience. In its early stage, before the local phenomena are developed, it is not an unusual occurrence, by a protracted course of free perspiration, to arrest the disease. This I have witnessed in numerous cases, and it has much influence on my mind in determining the nature of the disease.

The *diagnosis* of typhoid fever is a subject of much importance. Although I have already specified the principal diagnostic characteristics, while speaking of the general course and symptoms of the disease; yet I will here recapitulate, for the purpose of impressing them more deeply on your minds, by presenting them in a distinct group, separated from those symptoms which belong in common to this and other diseases.

The initiatory stage presents some peculiarities, which should receive attention, with a view to diagnosis. While this stage is uniformly more slow in its developments, and more protracted than in other forms of fever, its symptoms indicate an involvement of the nervous system from the very first, to an extent peculiar to this disease; and these two circumstances, taken in connection with the appearance of the tongue, which is generally clear from fur, and healthy in appearance, or at least not so much affected as in the commencement of fevers generally, afford good grounds to anticipate the development of typhoid fever.

The peculiar character of the diarrhea, is a symptom of some consequence in this relation. While diarrhea often accompanies attacks of other forms of fever, it is seldom so persistent and unyielding as in this disease; nor is there in other disorders that peculiar dirty yellow color and offensive smell, which characterize the evacuations in typhoid fever.

The frequency of the pulse, together with its hard, wiry, yet feeble character, is characteristic of this disease. True we often have a rapid pulse in congestive fever, but it does not seem to combine the qualities of irritation and debility in the degree generally observed in typhoid; and in other diseases, an acceleration of the pulse is generally attended with an increase of volume and force. In typhoid, the pulse is seldom less than one hundred per minute;

but whether more or less frequent, it is found to be small, wiry, and feeble.

There is a peculiarity of *countenance* presented by most patients in this disease, which it is more easy to recognize than to describe. It is a kind of indefinite, vague expression; partaking as it were, in many cases, of sprightliness and obtuseness; for, while the eye will appear to be unusually bright, especially in the early period of the disease, the features generally will present a dusky, unmeaning appearance,—showing that the luster of the eye is not a reflection from the mind.

Finally, the *eruptions*, which I have before so carefully and minutely described, when they make their appearance will leave you no longer in doubt. But you must learn to distinguish between the rose-colored, lenticular elevations, the color of which recedes on pressure and which are scattered over the surface, peculiar to typhoid, and the red, irregular, more numerous spots, which maintain their color under pressure, sometimes attendant on low cases of congestive fever.

The *prognosis* of typhoid fever, under proper treatment, I regard as generally favorable. It is true that the statistical reports of the disease denote that it has, under certain circumstances, proved exceedingly fatal; while at other times and in other places, it has appeared remarkably mild. These differences no doubt result in part, from variations in the intensity of the cause; but more I apprehend is attributed to differences in the modes of treatment.

According to my own observation and experience, a harsh, debilitating mode of practice in typhoid fever, always aggravates the symptoms, and tends to produce fatal results; while under a mild, sustaining, yet soothing course, few diseases of any gravity will so generally terminate in health.

The unfavorable symptoms in a given case, may be thus enumerated: Delirium, or great mental depression; coma; great subsultus tendinum; spasmodic action, or rigidity of the muscles; excessive diarrhea; involuntary discharges; hemorrhage, especially from the bowels; an extremely frequent pulse, say 130 or more, with great feebleness; coldness of the skin, attended with a clammy sweat; profuse perspiration, with great prostration; and very great abdominal distension. The favorable symptoms are of course the opposite of those just mentioned; but I may remark, that however grave the symptoms may have been, a tendency in a part or all of them to yield under treatment, or the spontaneous

resolution of any of them, as evincing the renewal of vital energy, will be regarded as favorable.

The *treatment* of typhoid fever has been, and still is, a subject of much interest and investigation. Many methods of treatment have been employed by different members of the profession, who have of course, been governed by the theory they have entertained as to the nature of the disease. Experiments have been made, both in private practice and hospitals, for the purpose of determining, if practicable, which of the many methods proposed would lead to the most favorable results. But all these experiments have seemed to fail in the establishment of a mode of treatment, satisfactory to the mass of the profession. Experiments made under circumstances highly favorable for arriving at the truth, have under different practitioners, resulted in unsettling the therapeutics of the disease, by the introduction of new methods of management, which while they supplanted existing methods were at diametrical variance with each other. The consequence is, that the student can not possibly derive from the books such a system of medication for typhoid fever as will be satisfactory to him, or command his confidence. To verify this assertion, I shall now give you a synopsis of some of the various methods which, under indorsement of influential practitioners, are placed in competition for professional favor.

Dr. Jackson, of Boston, after many observations and experiments, both in private practice and in the Massachusetts General Hospital, recommends the following course:

First. Cessation from labor; abstinence from food, except of the simplest, liquid kind; and a state of repose.

Second. Free evacuations as soon as possible; "It is especially important they should be made as early as the third day." First, "an emetic of tartarized antimony," "then an active cathartic, or the two combined." If there is constipation, an active enema at first, to "facilitate the action of the cathartic." "If vomiting and purging are not followed by great relief," venesection should be practiced on the following day, unless the constitution should be feeble, or the case very mild.

Third. If the disease has not subsided, give tartarized antimony every two hours, in increasing doses; keep the bowels open, and for two or three days "calomel should enter into the medicine used for this purpose; not, however, more than one moderate dose in a day." "It should be noted, however, that usually after the

antimony has been given for forty-eight hours, this will act sufficiently on the bowels, and that sometimes *it must be restrained by opium.*"

And yet a *scientific* practitioner advises its employment, even in typhoid fever.

Fourth. "When the disease subsides early under any active treatment," "the patient should be restrained from solid food for two or three days, at least, after he has appetite for it;" and "then use vegetable food in small quantities, for two or three days more." Should be confined to his room, but not wholly to bed, and not talk on business or any interesting subject, until convalescence is fully established.

Fifth. "Evacuations, vomiting and purging at least, may be resorted to with advantage in the second week;" and "perhaps some benefit may be obtained from antimony, in small doses, when commenced in that week." But "after that period no active treatment should be employed, or none that will cause any serious inconvenience to the patient."

Sixth. The usual admonitions as to diet, and the obvious duty of watching the progress of convalescence, and so guiding the patient and guarding him from the dangers of indigestion.

Seventh. The use of cordials to be regulated by the peculiarities of the case, seldom does hurt at a late stage of disease, where the patient is enfeebled, and no more is given than is grateful to the patient. "When he spontaneously demands them, as late as the third week, they will almost always be found useful. By cordials are meant vinous liquors. Cider has been commonly found grateful, beginning with an ounce, two or three times a day, and increasing according to the effects. Sound beer or ale is more rarely, but sometimes grateful. In patients much exhausted, however, the strong foreign wines, Sherry, Port and Madeira, are found most useful. The articles may be diluted, or may be employed to season articles of diet, or may be given alone, according to the taste of the patient."

"Dr. Jackson's faith in the usefulness of calomel was shaken a few years after the commencement of his practice; when the Massachusetts General Hospital was opened, he still resorted to it occasionally during the first few days of the disease, and particularly when any secondary inflammation supervened; but confidence in the specific power of the medicine grew less and less, and since

1830, its use in the hospital has been nearly abandoned."—*Bartlett on Typh. etc.*, page 148 et seq.

The following synopsis of "*Chomel's Method*," I condense from *Bartlett on Typhoid, etc.*, page 158 et seq.

"The treatment of typhoid fever has been, especially for the last fifteen years, a subject of great interest among the physicians of the large hospitals of Paris. It was in these institutions, that the symptomology, diagnosis, and pathology of the disease were first thoroughly studied; the opportunities which they offer for a careful trial and comparison of different modes of management are unequalled; and these opportunities have been very faithfully made use of by a considerable number of cautious, accurate and philosophical observers. Among them may be mentioned particularly, and this without any invidious distinction, Chomel and Louis. Chomel has been for many years attached either to La Charité or to the Hotel Dieu; he has grown old in the constant and conscientious study of disease; and now, in the ripe maturity of age and experience, is unsurpassed in the capital of France as a man of practical sagacity and skill. I shall first give a summary of his practice in this disease." *

His treatment is for the most part what is called rational or symptomatic. Simple and benign cases may be very safely trusted, he says, to refreshing drinks, such as lemonade, currant water, orange water, or pure water taken at short intervals and in such quantities as the patient may desire; emollient fomentations or poultices to the abdomen, when this is painful; sponging the surface of the body, if the skin is hot; cold applications to the head, if painful; and hot poultices and sinapisms in case of drowsiness and disturbed sleep. He is inclined to think that a single moderate bleeding at the commencement of the fever may be of some advantage in modifying present symptoms, preventing ulterior complications, and influencing favorably the march and termination of the disease. If the headache or pains in the abdomen are severe, leeches may be applied below the mastoid processes, for the former, and near the arms for the latter. For constipation, a gentle laxative; for troublesome diarrhea, rice water, injections of starch and water, etc.

Strike out the recommendation for bleeding, and this is a truly rational, and I doubt not a successful mode of treating these mild

* *Lecons de Clinique Medicale.* Par A. F. Chomel, p. 449, et seq.

forms of typhoid fever. Bleeding would I apprehend very often rob them of their mildness. Chomel "is inclined" to think favorably of it; I am not only "inclined," but constrained by reason and observation to think otherwise.

In what he calls the inflammatory form of the disease, Chomel adopts a more decided antiphlogistic course, such as bleedings, leeches, entire abstinence from food, etc. For bilious symptoms, as a yellow fur on the tongue, a bitter taste, nausea, vomiting bile, and constipation, he relies on the same treatment as for the simple form. Seldom gives even an emetic, finding it unnecessary; though where the attack is sudden and the stomach oppressed by its contents, an early emetic would, he thinks, be useful.

In the adynamic form he adopts a decided tonic and stimulant treatment, adapted to the degree of prostration and debility. Where the failure of muscular strength is extreme, he gives tonics, aromatics and cordials, as cinchona, wine, camphor, ether, etc. He prefers cinchona in the form of an extract, administered in an aromatic potion to the amount of one or two ounces in twenty-four hours. He also employs it in decoction as a drink, and at the same time gives either the decoction or extract in the form of enema.

While the adynamic phenomena are moderate, and before the free use of cinchona is deemed necessary, he uses light wines, as Bordeaux and Burgundy; when these phenomena are more strongly marked, he resorts to the stronger wines, such as Madeira, Sherry and Port. Ether is to be used when there is an urgent necessity for rapid and immediate stimulation, and with this he combines the extract of cinchona. Camphor he rarely uses except as an ingredient in tonic injections. He speaks more decidedly of the evils attending the application of blisters, than of any benefits to be derived from them.

For hemorrhage he recommends the usual means. A cold astringent solution for epistaxis, or if necessary plugging the nostril. For hemorrhage from the bowels, iced water for drink, in injections, and applied upon the abdomen; lemonade, and extract of rhatany. Local inflammations he meets by local and general bleeding, adapted to the circumstances of the case. "If the patient is in a condition not likely to tolerate these measures, dry cupping and sinapisms in the neighborhood of the inflammation, which is most commonly a pneumonia, may be substituted."

Gentlemen, I have never seen, nor do I expect ever to see a case

of genuine typhoid fever, in a condition to "tolerate" general bleeding to the extent of controlling pneumonia, or any other local inflammation. The idea appears to me to be utterly preposterous. But mark what follows:

"When these complications take place, during the adynamic period, or in the adynamic form of the disease, they do not contraïndicate stimulants and tonics. The local inflammation, under these circumstances, will be more surely relieved, or enabled to relieve itself, by a removal of the extreme general debility, through the agency of a tonic medication, than by the abstraction of blood."

How ingeniously men of *science* can frame language into sentences, which may serve as light craft to enable them to navigate the shallow waters of inconsistency, into which they are often carried by the current of false theories. I suppose the learned author almost imagined he heard some inquisitive student inquire, Would you seek to check epistaxis or hemorrhage from the bowels, if a patient had local inflammation? or suppose that while you were giving cinchona and stimulants to keep a patient from sinking, you should discover symptoms of pneumonia, would you suspend them, and open a vein?

And gentlemen, if this be sound old-school authority; if tonics and even stimulants are not contraïndicated, in certain conditions of typhoid, by pneumonia and other inflammatory complications; let me once more inquire, what becomes of the long and strenuous contentions, maintained by the advocates of the doctrine, that sulphate of quinia is incompatible with inflammation, or even fever, in intermittent and remittent fevers? Surely, the same rule should apply in all these cases.

In 1831, Chomel commenced the trial of chloride of soda in typhoid fever, in connection with the system of management of which an outline has just been given. He administered it in a sweetened solution of gum arabic, containing from one grain to one grain and a half to the ounce. Of this solution, his patients generally took from fifty to ninety ounces in the twenty-four hours. Injections of the same solution were given morning and night; the body of the patient was freely washed several times a day with a solution of the chloride in water; poultices moistened with it, were applied to the abdomen; the bed-clothing was sprinkled with it, and vessels containing it were placed under the bed.

After employing this additional treatment from 1831 to 1834, he says: "Finally, although the results of this treatment have been very different in different years, it has still been attended with more success than any other. Several distinguished practitioners have informed us that they have arrived at the same conclusion. We shall continue then our trials with a mode of treatment, which combined with the rational method, has thus far given us, notwithstanding its failures, more satisfactory results than any other." "Subsequent to this, however, in 1835," remarks Professor Bartlett, "with a frankness, a conscientiousness, a single-minded regard for the truth, which it is beautiful to witness, he says: 'The hopes, which our first trials with the chloride had permitted us to conceive, have not been realized. The results which have thus far been obtained, are not sufficiently encouraging to justify us in the expectation of continuing our trials with much chance of success.'"

This confession of the failure of chloride of soda, which at first gave such hopes of success, when we remember that it was only employed in addition to Chomel's ordinary course, certainly does not indicate that the results of his method without the chloride, could have been very satisfactory. And should not the same honest regard for truth, which led him to record its failure, have called forth an expression of distrust in regard to some of those more heroic measures which he employed, and evidently with as little advantage? Why did not he, and why do not the profession generally, honestly confess that the lancet, antimony, and mercury have failed, as they evidently have, to justify the reliance which has been placed in them? Prof. Bartlett well remarks that such frankness "is beautiful to witness;" and its rare occurrence contributes much to increase its beauty. How easily might the temple of medical science be festooned with such ornaments, should her votaries generally follow the example set by the venerable Chomel in this instance.

Louis' method of treatment in typhoid fever, may be very briefly stated. He commences with blood-letting, proportioned in extent and repetition to the strength and vigor of the patient, and the severity of the disease. This, he thinks, should be done within the first ten or twelve days. Thinks it generally shortens the duration of the disease a few days; diminishes its gravity, and lessens its mortality. Has not however, found its immediate effects very obvious. It appears sometimes to meliorate urgent symptoms; at other times to aggravate them.

This measure may be aided by suitable mucilaginous drinks, emollient enemata, and cool, fresh air. If diarrhea be persistent, a small injection, containing a few drops of laudanum, should be used.

Tonics are considered very useful and necessary, when the general febrile excitement has subsided; where there is extreme prostration; when the pulse is only moderately accelerated, or not at all; and when there is slight diarrhea; and little or no tympanites. Prefers sulphate of quinia to any thing else, in doses of eight to twenty grains, given in mucilage. Gives cinchona in infusion, for drink; and in diarrhea, administers tonic and astringent injections.

He condemns and rejects blisters in this disease. He thinks opium of use in allaying nervous symptoms, when the febrile excitement is not high. He has seen little or no benefit from leeches, or the application of ice to the head, in violent delirium; but, if the face is flushed, advises another moderate bleeding, even as late as the fifteenth day; although the patient may already have been twice bled.

The following are his concluding words on this subject, as quoted by Bartlett, from whose work the summary just read is an abridgment.

"It results from all that precedes, upon the effects of the principal therapeutic agents at present employed in the treatment of typhoid fever, that these agents possess a favorable, though limited influence, upon the march and termination of the disease; and that an impartial examination of facts points out, with a good degree of precision, the best method of employing the three principal means which experience has placed in our hands, to wit: blood-letting, evacuents and tonics. Furthermore, the limited degree of success which has thus far been obtained, ought not to discourage the friends of science, nor prevent them from hoping, that a more appropriate and successful treatment of this disease will yet be discovered. Who would have foreseen the effects of opium, of cinchona, or the preservative power of the vaccine virus? What accident and observation have hitherto done, they are still able to do; without doubt they will do; and therapeutics, like the other parts of science, ought to hope and to expect every thing from observation."

Here you perceive we have a confession also, of the failure to a considerable extent, of the mode of treatment pursued; but it is

not coupled with a conviction that the active, I might say heroic, measures employed, are of doubtful propriety. No! blood-letting, evacuants and tonics, have been placed in our hands by experience; and though experience has not demonstrated their efficiency, especially as regards the depletive measures; nay, though suspicions are raised that they sometimes at least, aggravate urgent symptoms,—still until accident or observation shall give us some better mode, we must continue to use these active measures. Why not trust to the efforts of nature where it is doubtful whether your measures will assist, and where it is probable they will embarrass those efforts? If you must give something in these cases, let it rather be an agent which will have no effect at all, than one of positive power, which may be exerted against the health of your patient.

When we turn to the statistics of the disease, under the methods of management just described, and others of a similar character which might be noticed, we certainly find but little encouragement to follow any of these plans of treatment. The bills of mortality, wherever the disease has prevailed in a severe form, present melancholy evidence of the failure, indeed, I should say, the injurious consequences of such medical interference. Making all proper allowance for the difference in favor of private over hospital practice generally, I solemnly aver, that I have never witnessed the prevalence of typhoid fever in a form that would justify one-fourth the average fatality recorded in the books; and I have been an attentive observer of the disease in New England and in Ohio, for about twenty-five years. Just listen to the authorities. During fourteen years, from 1822 to 1835 inclusive, the average ratio of deaths to the cases treated, in the Massachusetts General Hospital, was as one to seven, or more than fourteen per cent. During one year of this time, the mortality was one in three and a half cases, or more than twenty-eight and a half per cent. The reports of Louis show a mortality of over thirty-seven per cent., and in the Chomel wards in the Hotel Dieu, about one-seventh of the cases, or over fourteen per cent., terminated fatally.

I trust gentlemen, your practice will never exhibit results like these.

LECTURE XV.

MALARIAL FEVERS—CONTINUED.

Discussion of Treatment continued; Dr. N. Smith's Method; Review of the Authors cited; Proper Treatment; Remedies Recommended; Cases cited; Typhoid may be cut short; Further Measures for Protracted Cases; Management of Convalescence.

TYPHOID FEVER—CONTINUED.

In my last lecture I gave you summaries of three modes of treatment, in illustration of the great diversity of methods adopted by the profession, and of the unsettled state of the medical mind in regard to the therapeutics of typhoid fever. Two of the methods referred to—those of Jackson and Louis—are, you have observed, decidedly active and depletory, while that of Chomel is more moderate and expectant, mixed however, with a little heroism and experiments with suggested means.

I will give a synopsis of Dr. Smith's mode of treatment before I present my own, merely introducing it with the remark, that though I differ from him as to our ability to cut short the disease, in its early stage, in many cases, I regard his method as much more philosophical than that of any other author whose treatment I have read, and that, with a few modifications, my own experience justifies me in speaking of it in a highly favorable manner. I therefore call your special attention to the method of Dr. Nathan Smith, as found in Professor Bartlett's work on Typhoid, etc., pages 154 et seq.

He first remarks, that he had never seen a single case in which he was satisfied he had been able to cut short and arrest its progress; and that where the disease is going on regularly in its course, without any symptom denoting danger, and without any local distress, active interference will be likely to do more harm than good. Under such circumstances, he thinks, no medicine should

be given. He is convinced that all powerful remedies or measures, in the early stage, do harm, and that patients treated with them in the beginning, do not hold out so well in the latter stages of the disease. He has seen many cases in which persons in the early stages of this disease were moping about, not very sick, but far from well, and who upon taking a dose of tartrate of antimony, have been immediately confined to their beds. He thinks that in simple, mild forms of the disorder, "we had better leave the disease cure itself; as remedies, especially powerful ones, are likely to do more harm than good." He advises simple diluent drinks, a very little farinaceous food, and the avoidance of all causes of irritation.

He opposed the plan of general blood-letting at the commencement of the disease; would bleed only when there was "uncommon pain in the head, accompanied with great heat in that part, a sense of fullness, and a throbbing of the temporal arteries, or marks of congestion in the viscera of the thorax." Here he thinks that the loss of twelve or sixteen ounces of blood will often mitigate the severity of the disease. The immediate effects of bleeding have not however, appeared to him very obvious, and he says that where the pulse is very frequent, the operation is seldom or never attended with any advantage.

Emetics are recommended by Dr. Smith, only where there are nausea and oppression, either at the commencement, or during the progress of the disease. His favorite articles are ipecacuanha, eupatorium, or sulphate of zinc, given either singly or combined. Tartrate of antimony he looks upon as an inappropriate and unsafe remedy. The bowels should be kept open by gentle laxatives, but active and indiscriminate purging he considers hurtful. Blisters he thinks may as well be generally dispensed with; they may relieve local pain, but are sometimes injurious. Stimulating remedies internally, with external heat, to excite active perspiration are attended he thinks with bad consequences at all periods of the disease. Opium he says may be used with advantage, for the purpose of procuring rest and quietness during the night, when it is not contraindicated by high febrile excitement and pain in the head, and in combination with ipecacuanha and camphor, to restrain immoderate diarrhea. He has seen in many instances, very serious evils from the specific action of mercury, but no benefit. Cinchona he has found to produce a good effect in some cases, where the surface was cold, and also where there was hemorrhage. The mineral and

vegetable acids, the alkalies—refrigerants, as they are called—such as sulphate of magnesia, supertartrate and nitrate of potash, he regards as unimportant or questionable remedies.

The most effectual refrigerant and febrifuge, in the hands of Dr. Smith, consisted in the free use of cold water externally. He very strongly commends this measure. He directs the patient to be uncovered, and then sprinkled or dashed repeatedly, with pure cold water. He allows cold water as a drink, as freely as the patient may desire, during the whole course of this disease. As to the general care of a patient in typhoid, or as he calls it, typhus fever, he says: "He should be kept in a spacious room, the larger the better. His bed should be of straw or husks, especially if it is the warm season; and it should not be placed in the corner, but brought out into the room. We should contrive to have a current of air pass over the bed, by means of doors and windows. * * * In the warm season of the year, the windows should be kept open night and day. All the furniture should be removed, except such articles as are required for the patient's use. The windows should be darkened, or something opposed to the light in such a way as to still admit the air. The room should be kept as quiet as possible, since noise is injurious, and no more persons should be admitted than are necessary to take care of the patient, which will, if he is very sick, require the labor of more than one.

"The room should not be carpeted, and the floor should be often washed with pure water, or soap and water, and in the hot season, it, as well as the walls, may be kept wet with water during the heat of the day.

"Cleanliness is absolutely essential to the patient's comfort, and no dirty dishes, or useless medicines or food, should be suffered to remain in the room. All excrementitious matter should be removed immediately. In the warm season of the year, the bed and body linen should be changed every day, and in the cold, every other day at furthest.

"The patient's body and limbs should be cleansed every day with a piece of sponge and warm water, or soap and water. If a male, he should be shaved every day, or every alternate day; and if a female, with long thick hair, it should be cut off, or thinned, so as to leave but little of it the full length."*

Having now put you in possession of the views of treatment

* Smith's Medical and Surgical Memoirs, pp. 95, 96.

of four eminent practitioners, of about equal respectability and authority in the profession, I might raise the question, which should we follow? And I frankly confess, that in the absence of experience to aid me in the solution of the question, I should not be able to make a satisfactory selection. I should doubtless hesitate to adopt the apparently inefficient *placebo* method of Dr. Smith, unless, like him, I believed it impracticable to arrest the disease, even in its early stage; I should fear to employ the lancet, and tartar emetic, and purgatives, with Jackson, Chomel, and Louis, for they do not agree with each other in regard to some of these; they evidently are not satisfied with their own practice, and the published statistics demonstrate its failure, if not its injurious effects. And thus, in the present state of medical knowledge in regard to this and other diseases, the inexperienced practitioner is compelled to choose between variant plans of treatment, and probably sacrifice valuable human life in experiments to determine what mode of management is best adapted to cure.

Having myself experienced the embarrassment resulting from this confusion and clashing of theories, I feel anxious to define a mode of treatment which after years of observation and experience, I have adopted; which, by the institution of efficient means, shall cut short such attacks as are susceptible of being arrested; and which, at the same time, by the avoidance of all harsh, irritating, and debilitating measures, will leave the patient all his constitutional vigor with which to bear up under the disease, if it must run its course. If I shall succeed in so presenting such a course of management as to gain your confidence, and induce you to give it a fair and impartial trial in future practice, I shall feel that I have not only rendered you a service, but have subserved the cause of humanity.

In the treatment of typhoid fever we should aim to eliminate from the system the malarial poison, by such means as shall not diminish the vital forces, nor hasten the development of the specific intestinal disorder; and we should relieve the case from the depressing influence of periodic or marsh malarial fever, which in this western country, very often complicates the attack at its very commencement. Having treated the case with reference to these two indications, should it not then be arrested, a third general indication will remain to be fulfilled, and that is, to foster the strength and vigor of the patient, and thus enable his system to endure the force of the disease, or possibly throw it off.

I need not speak of the two indications first named separately, because fortunately they do not contra-indicate each other, but the remedies adapted to fulfill one, are at least corroborative of the treatment called for by the other. Where there was reason to suspect the influence of marsh malaria, even though the periodic tendency were so obscure as to be scarcely recognized, I should at once exhibit the antiperiodic agents. I would give the quinia and iron, mixed in equal quantities, in doses of three grains each, every two hours, until cinchonism was produced, unless the fever should evidently rise; in that case, I might suspend the antiperiodics until evidence of a remission, more or less perfect, in the fever, had made its appearance, employing in the meantime such palliative measures,—the alkaline and whisky sponge bath, gently fanning the head if it were hot, and diluent teas,—as would tend to lessen febrile excitement. But generally you will find the fever mitigated by the direct influence of the quinia and iron. Their administration will generally produce a gentle diaphoresis, and a remission if not an intermission will follow, which in some instances will be an end of the disease, the patient being entirely relieved from the morbid influence. This is the very result at which I should aim at this stage of the case, and to make its attainment the more probable, I would advise the use of mild, unirritating diaphoretic and diuretic medicines, to be used in alternation with the quinia and iron. For this purpose, make a solution of acetate of potassa, ten grains to an ounce of water, and give one teaspoonful every two hours, alternating, as before remarked, with the quinia and iron. This may be continued, even though it should appear proper to suspend the antiperiodics. As adjuvant to these remedies, let the patient drink freely, as he may be willing, of an infusion of mullein, which is an unirritating yet efficient diuretic; or if the stomach shows signs of irritation, indicated by a red tongue, the marsh mallows (*althæa officinalis*) may be substituted. By such a course of treatment you will seldom fail of making a manifest impression, even if you do not completely arrest the fever the first day. If however, the antiperiodics are suspended because of the rise of the fever, or should fever rise the second day, in all such cases, calm down the fever by the soothing diaphoretic and diuretic agents, and by bathing and fanning the surface, and again administer your quinia and iron as the fever subsides.

The second day's treatment will, almost without fail, arrest the periodic complication, and if the typhoid disease do not disappear

under the reactive energy of the system, it will not be in the least degree aggravated by the measures I have recommended; but very often both morbid influences will be eliminated or dismissed together, and the patient recover, after only two or three days' confinement.

Upon this subject, gentlemen, I am not talking at random;—and although I can not claim to “speak by the book,” I can do what is better, I can speak from experience. I have seen scores of cases resolved at once by the simple measures I have mentioned, which I am confident would have developed the grave symptoms of typhoid fever, and in some instances would probably have proved fatal, under another plan of treatment. I will mention a case in point. Not long ago I was called to a family, three of whom were down with unmistakable signs of typhoid fever. One of them was exceedingly sick, and died in a few days. The other two lingered a week or two longer, and recovered. They were all under the management of another physician previous to my being called. The two cases which recovered were too far advanced to be relieved at once, yet the antiperiodics exerted a beneficial influence on the symptoms of both, and probably shortened the duration of the disease. Two other members of the family were taken with the same symptoms as the first three, and were tending evidently to follow the same course. These were both relieved at once by the treatment just before described, without an emetic or cathartic or the loss of a drop of blood.

Where I had no reason to suspect the presence of marsh malarial influence, I should not deem it necessary to employ the quinia and iron, though even then they would do no harm. I might give them with a view to their febrifuge effect, but not to the same extent as when I desired their antiperiodic influence. But whether the quinia and iron were or were not deemed advisable, in a case of uncomplicated typhoid fever, I should still resort to the other measures named. I should bathe the surface as in other fevers, to allay the febrile excitement, and I should by the use of the acetate of potassa, the infusion of mullein, our sudorific tincture, and other unirritating measures, endeavor to produce free perspiration and diuresis, which when induced, I would maintain ten or twelve hours, with a view of eliminating from the system, by means of the renal secretion and cutaneous exhalation, the poisonous element which was overwhelming the nervous forces, and vitiating the vital functions. And here I should expect to succeed, as I have

succeeded, in a large number of cases, in cutting short the disease, and restoring the patient to complete health in a very few days.

I say, I should thus expect to cut short the disease in the commencement of its march, and I hold that such an expectation is not unreasonable, even if it had not been justified by experience. Why not arrest the morbid power of animal as well as that of vegetable malaria, before structural lesion has been produced? Why not enable one individual to throw off a depressing influence which hundreds of others equally exposed are able to withstand without assistance? But I would not expect to throw it off by bleeding or purging, or even vomiting my patient. Bleeding will exhaust the system of the healthy as well as the unhealthy constituents of the blood, and is a measure directly calculated to depress, irritate, and prostrate the patient. Active purgation must unquestionably tend to produce intestinal irritation, and hasten the development of those enteric symptoms, which characterize the disease when fully established; and thus add to the gravity of the most serious feature of the disorder.

If there were evident accumulations in the bowels, I should remove them by a mild enema, or if this did not succeed, I should administer an aperient, such as olive oil, or if there were a manifest acid condition of the alimentary canal, our neutralizing mixture* might be given, to the extent of gently moving the bowels. But beyond this I would not go in the use of purgatives; I would rather let the bowels alone, and even risk the evil effects of accumulations, than produce active catharsis.

If there were nausea or vomiting caused by the presence of irritating substances in the stomach, their ejection should be favored by a gentle emetic; but no tartarized antimony, nor even ipecacuanha or other impalpable powder should be given, which, by adhering to the mucous membrane, might produce and keep up very serious irritation. If emesis is to be produced, let it be effected by means of the infusion of lobelia inflata and eupatorium perfoliatum. This will accomplish the object with more promptitude, and less permanent prostration or irritation than any other. I have tried it too often to be mistaken; having never been disappointed by it, nor seen the least unpleasant result grow out of its use.

If by the measures I have described, the disease be not arrested,

* Best Turkey Rhubarb, Sup. Carb. Potass., Peppermint leaves and Pulv. Cinnamon, of each two drachms to half-pint hot water. Dose—a tablespoonful every hour.

you have a case on your hands which demands your most careful and prudent attention; and though you should not despair even yet of seeing the system rise superior to, and throw off the malady, still you should be prepared to see the fever pursue its wonted march, and develop the train of phenomena in greater or less severity, which ordinarily attends upon it. And again I warn you against an active, harsh interference, with a view to arrest the disease; for you will by adopting such a course, aggravate the severity of the case, and diminish the chances of recovery. Better by far abandon your patient to the resources and energies of his own constitution, than attempt to bleed, vomit, purge, or mercurialize the disease from his system. On the contrary, let all your efforts be directed to calm nervous irritation, allay febrile excitement, counteract and arrest local inflammation or congestion, and husband and sustain the vigor of the system.

One of the most important measures now within your control is the bath. This may be pure water or broke water, applied cold with a sponge to the whole surface, or broke water and whisky, applied warm in the same way and allowed to evaporate, where there is much heat; otherwise it should be followed by friction with a dry towel. The warm sponge-bath, followed as it always is by a more rapid evaporation than the cold bath, is a genial, yet efficient mode of reducing febrile heat, and when the heat in the head is great, the evaporation may be greatly favored by a gentle motion of the air produced with a fan. The bathing should be repeated every one or two hours, and in the manner most agreeable to the patient. The importance of this constant attention to the surface, is self-evident to any one who duly appreciates the sympathy which exists between the cutaneous and mucous surfaces, and the influence which may, by this means, be exerted upon the capillary circulation and the nervous system. By this measure both sensible and insensible cutaneous transpiration is promoted, and the elimination of poisonous effete matters of the system is greatly favored. It equalizes the circulation and tends to maintain its equilibrium, and it calms nervous excitement, allays irritation and mitigates very much the suffering of the sick. I have often seen my patients restless, wakeful, and irritated by the distressing heat and nervous disorder, calmed down to a condition of comfort and repose, by the application of this invaluable measure. Let it never be forgotten or neglected throughout the entire course of typhoid fever.

Instead of the blister recommended by some authors, and which I formerly employed over localities where inflammation was present, as the thorax or abdomen, I now apply the scarificator and cups, and follow these with a hot fomentation of hops put into a bag and wrung out of hot water; or the hops may be mixed with bread and milk, forming a poultice, and laid upon the surface after the cups are removed. A fresh poultice should be applied every ten or twelve hours. Or when there is great heat and tension of the abdomen, a folded linen of four or five thicknesses, wrung out of cold water, may be placed over the entire abdomen, and changed once in two or three hours, so as to keep up a constant moisture and evaporation. I have derived the most decided advantage from this expedient, in a great many instances. It may be continued, by repeating as directed, for a number of days, and will rarely fail in manifesting its salutary influence, not only in relieving the abdominal tension and heat, but also in its quieting and sedative effect on the febrile symptoms and general nervous disturbance.

If the bowels are irritated, soothing injections, such as a solution of starch with a little laudanum, will be of much service, and may be administered without apprehension of aggravating any symptoms of the case. It is a point of considerable importance to restrain the tendency to constant discharges from the bowels. Though it is generally desirable to have the bowels sufficiently open to prevent the accumulation of morbid secretions, yet I have often allowed patients to go a number of days without a passage from the bowels, when great irritability had previously existed. It is better to have the bowels entirely quiet under such circumstances, as the inflammation will be more likely to subside.

In those cases of inactivity of the bowels which sometimes occur, connected generally with torpor of the liver, it will probably be necessary to resort to some gentle means to correct the difficulty. For this purpose the compound taraxacum pill, heretofore often recommended, may be given with a view of producing a very mild aperient action; though when there is more torpidity of the bowels, an injection of cold water, or if that is insufficient, one of oil, molasses, and water, will very generally produce a sufficient alvine movement. The patient, or his friends, might not be satisfied by these gentle means, but I should not proceed further in the use of cathartics, even though urged to do so by the patient himself.

In cases of a low grade of fever, with a tendency to coldness of the extremities, carbonate of ammonia, ten grains to an ounce of water, given in drachm doses, every second hour, will have the effect of increasing the capillary circulation; it will also serve to correct acidity of the stomach, and it will at least satisfy the desire of the patient and his friends to be doing something for his relief. When designed however as a mere placebo, it may be given in solution just strong enough to satisfy the patient that it is not water.

It will often be found that cold water does not have the effect of relieving the thirst, so urgent in many cases, in which case warm dilutent drinks may be substituted. I find such drinks much more satisfying, in some cases, than cold water. Balm tea is one of my favorite remedies, being simple in its nature, with a very slight, yet pleasant, aromatic taste, and admirably efficient in allaying thirst. I have not found much benefit from the use of those effervescing draughts so much recommended in the books, but on the contrary they seem to aggravate the irritation of the mucous membrane; consequently I would not recommend their use. A far more suitable and equally effective means for relieving the dryness of the mouth, and diminishing the sensation of heat both in the mouth and stomach, will be found in a cold infusion of the root of marsh mallows or *althæa officinalis*. It should be prepared fresh every day, and used in such quantities as may be desired by the patient. This will act also as a diuretic, which will be an additional reason for its use, where it is desirable to increase the renal secretion.

After the principal symptoms of typhoid fever have been developed, including the characteristic eruption, great irritation of the bowels will constitute a troublesome and important symptom, not to be neglected. Where the diarrhea exhibits the mucous or hemorrhagic appearances, I am in the habit of giving nitrate of silver, one-eighth to one-twelfth of a grain, mixed with finely pulverized gum Arabic, made into a pill, repeated every three hours, but not to be continued longer than twenty-four hours. The effect of this prescription will be, to favor the action of the liver, by allaying irritation of the bowels; to excite healthy action in the diseased intestinal glands, and thus change the character of the discharges to a mushy and bilious appearance, which will be followed by a fine capillary circulation, and a return of warmth in the extremities. When the diarrhea is not attended with

hemorrhage or mucous discharges, I have found a remedy of great value, perhaps as much so as any other, in the spirits of turpentine, given in doses of five, six, or eight drops, repeated every two hours. It will not however, be likely to act favorably in those cases where the tongue is red and smooth; and in any case, if a beneficial effect is not manifest in twenty-four hours, it should be discontinued, and ammonia in weak solution given in its place.

You will meet with some cases of extreme irritability of the nervous system which it will be necessary to quiet. The administration of a few doses of valerian, of lupulin or of hop tea, will usually have the desired effect. When these remedies fail, and there is danger that your patient will rapidly sink for want of sleep, the diaphoretic powder, given in an eight or ten grain dose, and repeated in two hours, will rarely fail of producing a highly favorable impression, even if the entire effect desired be not produced by it. But I recommend these medicines with much hesitation, lest I may be misapprehended; for I hold that opiates are in most cases objectionable, and should only be administered when other means fail. In this light I felt it my duty to call your attention to them.

In some very severe cases, characterized by great restlessness and subsultus tendinum, especially if the heat of the skin had mainly disappeared, I have obtained favorable effects from the administration of ale. I prefer Scotch ale, diluted with water, sweetened with loaf sugar, and given in wineglassful doses every hour or two, according to the urgency of the symptoms and the influence of the remedy. I look upon this as the best stimulant and tonic, in these low grades of fever, which we possess; and I confidently recommend its use, not as a curative agent, but as an aid to nature in sustaining and restoring the energy of the system. In some cases of extreme danger, where the patient seemed to be rapidly sinking in spite of the means already mentioned, I have administered large doses of brandy toddy, and sometimes apparently with admirable success. Whether the brandy did really deserve credit for the reaction, or whether the case would have taken a favorable turn without it, as is sometimes seen, I can not say; but where a patient was sinking under the use of our ordinary measures, the surface cold, pulse rapid and small, with an apparent giving way of the powers of life, I should not hesitate to recommend large doses of brandy toddy

to be given, as warm as the patient could take it. In a few instances the brandy was administered in incredibly large quantities, without producing any symptoms of intoxication, but acting in a remarkable degree as a sedative to arterial excitement.

Convalescence must be managed with much prudence. It may be expected to advance slowly, especially at first, until food begins to be appropriated, and little can be done or should be attempted, to hasten its progress. But little tonic treatment will be borne at first, and but very few agents of this class seem at all adapted to the peculiar condition in which the system is left. The *ptelea trifoliata* however, seems when given in infusion to produce a very mild and genial tonic impression, without irritating, but rather soothing the irritated mucous membrane. It promotes appetite, enables the stomach to endure suitable nourishment, and favors the early reëstablishment of the digestive process, and it will be tolerated when every other tonic with which I am acquainted is rejected. The diet must be very simple and nutritious. It must be regulated, in both quantity and quality, with judgment, having reference to the effects experienced and the demands of the appetite. Generally the spontaneous suggestions of the patient's own mind will be safely followed in regard to the kind of food; but it should be taken in small quantities at first, and increased gradually as strength is regained.

It sometimes happens that upon the decline of the more grave symptoms, well marked periodical fever will intervene. This may in fact occur at any time during the course of the disease or during the progress of convalescence. Whenever I observe it, I do not hesitate in any case and under all circumstances, to exhibit the proper remedies for its arrest; and I repeat in this relation, what I have so often said before, that the antiperiodic treatment should by no means be withheld, through fear of aggravating the disease, or any complication associated with it. This is a matter of no small experience.

characteristics of this species of diseased action; but as there are exceptions, in which one or more of these symptoms are not manifested, you see the importance of investigating the subject so far as to recognize and appreciate inflammatory action, where the ordinary verbal definition is not fulfilled by its phenomena. If for instance, you suppose that inflammation must necessarily be accompanied by all the symptoms just named, and you meet with a case in which one or more of these symptoms can not be discovered, you will not recognize the existence of inflammatory action. But with a clear understanding of the nature of this morbid action, and aware that although, as a general rule, the four peculiar symptoms attend upon it, yet it is liable to many exceptions, you will be able to discriminate between the different aspects in which it will be occasionally presented.

Sometimes the symptoms of inflammation are very obscure, and require close attention in order to their recognition. Thus in some low forms of inflammatory action, pain appears to be entirely absent—the patient being unconscious of its presence, but upon a careful examination by pressure over the part affected, a degree of tenderness at least, will usually be perceived. These variations in the manifestations of inflammatory action depend, to a considerable extent, on the kind of structure involved.

Redness is usually the earliest symptom of inflammation, and is more uniformly observable than perhaps any other. It will be seen in every shade, from a deep crimson to a slight flush, the intensity depending upon the degree of inflammation, its stage, the part involved, the condition of the system, and perhaps the nature of the cause. It is however sometimes wanting, as in white swelling, where, although there is heat, pain and swelling, there is no redness of the surface. There is evidently engorgement of the part, as shown by the tumefaction, but it is probably of a serous character principally, though it is possible that the vessels of the deep structures immediately involved, might upon inspection, be found to be injected with red blood. The surface in this affection is in fact paler than natural, hence the name “white swelling.”

The *increase of heat* is likewise variable in its intensity, though it is said never to exceed the temperature of the blood in the heart. The heat in an inflamed structure, is probably owing partly to the presence of more blood in the capillaries of the part, and partly to an increase of vital action. But inflammatory action may exist without any appreciable increase of heat; and we often meet with

cases where, although the inflammation is evidently of a high grade, yet the manifestation of heat is very slight, far less than the palpable condition of the case might lead you to expect.

Pain is a symptom of inflammation which is perhaps more variable in its manifestation than any other. It usually is an early symptom, sometimes the very first, and it occurs with every degree of intensity. It varies also in character, being sometimes sharp and lancinating, at other times dull and obscure; it may be throbbing, or it may have a pungent, or a burning character. Sometimes the pain is intermittent or remittent. Occasionally there is a mere soreness, perhaps unnoticed by the patient except when moved, or when pressure is made upon the part. Oftentimes the sensation of pain far exceeds what the amount of lesion would appear likely to produce, and it perhaps as often falls below what would be expected. The degree of pain depends much upon the structure involved, as well as the stage and degree of the inflammatory action; and it is a remarkable fact, that tissues which possess little or no sensibility in health, often become intensely sensitive and painful when inflamed; as the bones, tendons, ligaments and serous membranes. Another fact is worthy of remembrance, and that is, that the pain is often felt in a part distant from the seat of inflammation; as in the glans penis from inflammation of the bladder, and in the knee from disease of the hip.

The *swelling* generally attendant on inflammatory action also presents great diversity in its extent,—sometimes amounting to a mere thickening of a mucous membrane, at other times presenting the most enormous distension, as in inflammation of some of the glands. In some of the structures, swelling can not be regarded as an attendant of inflammatory action, as in the serous membranes, and scarcely in the alimentary canal. It is in those soft structures which abound in areolar tissue that this symptom is more fully developed. It is caused by an engorgement of the vessels belonging to the part, by effusion into the structures, and finally by the production of additional capillaries and the growth of new structures.

I have thus given you a brief description of these four symptoms of inflammation, and you perceive that constancy in their development is by no means to be looked for; on the contrary, they may exist all together, in similar, or extremely disproportionate intensity; or any of them may be absent, or at least not observable, in cases where those present indicate a high degree of

inflammatory action. These are facts which it is important for you to remember, as without a knowledge of them you will be constantly liable to be misled in practice.

MODIFICATIONS OF FUNCTION AND STRUCTURE.

Inflammation necessarily modifies both the function and structure of the part involved. The functional changes may be briefly stated to consist of—first, during the initial or forming stage, an increased natural secretion of the part; secondly, on the establishment of active inflammation, a diminution or total cessation of the secretory function, as indicated by the dryness of the skin, if that organ is involved, or the dry, hacking cough, when the mucous membrane of the air-passages is inflamed. This is followed by, thirdly, a morbid secretion,—being an effort of nature to arrest or terminate the inflammatory action. Hence, we have the copious expectoration in the advanced stage of inflammation of the bronchial mucous membrane, and the peculiar mucous-like discharges in dysentery. Sometimes the fluids thus formed are very copious, as seen in dropsies, and the effusion tends to diminish the inflammatory action. The effusion of serum of which I have just spoken, must not be confounded with that of coagulable lymph, which, escaping from the vessels of an inflamed structure in the fluid form, soon coagulates, forming a substance capable of being organized and vitalized, if kept in contact with the living tissues. From this effusion and organization of coagulable lymph result those adhesions which take place between opposing surfaces,—as between the pleura costalis and pleura pulmonalis, etc., and also between the surfaces of a healing wound. True, the lymph and serum may be effused together, but the lymph, by its tendency to coagulate, becomes separated from the serum, just as the clot is separated from the serum of blood when drawn from the body. The tendency of lymph to become organized demonstrates its fibrinous character, and clearly distinguishes it from the albuminous exudation which sometimes takes place from irritated surfaces, and which, by evaporation, becomes consolidated, but never becomes a living structure.

The phenomena resulting from inflammatory action will be further considered, but before doing so, I deem it best, in order to a full comprehension of this branch of the subject, to speak of the causes of this form of morbid excitement.

CAUSES.

The *causes* of inflammation are of two kinds, *local* and *general*. Local influences, or local irritation, will produce inflammation, and the degree of the inflammatory action will depend much on the nature and amount of local irritation,—or in other words, on the character of the local cause,—but more on the constitutional condition of the individual at the time. If the system is in perfect health at the time the local cause of inflammation occurs, the resulting morbid action may be expected to be proportionate to the character of the cause that produces it, but very often the inflammation, following a given local irritation, differs in degree from what would be anticipated in a perfectly healthy system,—its nature and extent being dependent upon the general derangement of the system, but especially on the condition of the blood. Hence it is of the first importance, in observing the train of morbid phenomena connected with inflammatory action, to look to the general system, not only in regard to the condition of the blood, but to the character of the secretions and the constitutional predisposition to this form of disease. Proper attention in these respects will often enable you to anticipate and prevent inflammation, or at least to meet it successfully, when from the nature of the exciting cause alone you would not apprehend its production. The importance of this suggestion is exemplified in the predisposition to disease of particular organs of the body, as found in some persons, producing great tendency to the development of inflammation under the influence of causes which would not, under ordinary circumstances, produce such an effect. Thus, there is no necessary connection between inflammation of the lungs and of the bowels, yet where there is a strong predisposition to intestinal disease, whether hereditary or acquired, it is very likely to be developed during an attack of pneumonia. Again, it is no uncommon occurrence to find local inflammation supervene upon febrile action of a specific character, and readily subside upon the removal of the general febrile disease. This is often observed in our malarial fevers, where no local disorder is necessarily connected with the febrile disease; but where, from predisposition to local determination, inflammatory action is excited in some organ of the body. That the local inflammation in such a case is secondary, is proved by the fact, that an early arrest of the fever will cause the local inflammation to subside.

It may be asked why it is, that in some constitutions there exist these predispositions to local disease. I reply, that it is owing to some peculiar conformation or structure of the organs, over which it may not be in your power to exercise any control. And this fact will be important in your prognosis of the case, as well as in the selection of remedies. If you find an individual, for instance, with a strong hereditary predisposition to disease of the lungs, laboring under a present attack of pulmonary inflammation, your prognosis would not be so favorable as in a different case. So in some families, we meet with hereditary predisposition to disease of some particular organ—as the bowels, lungs or brain; and where such is the fact, it is an important guide in treatment. Where for instance, there is a natural tendency to inflammation of the bowels, our treatment for such an attack should certainly be quite different from that which would be proper in case of accidental inflammation of that part of the body. While in the latter case you might use very prompt and efficient measures to remove the local irritating cause, in the former you should pursue a more mild and soothing mode of treatment. Where there is constitutional predisposition to inflammation of the brain, it is a matter of great importance, which should by all means be known, and constantly borne in mind in treatment.

To conclude my remarks on the causes of inflammation, I ask you to note, that in view of what has been said, a local cause trivial in itself may excite morbid action, which from constitutional predisposition, may result in extensive and indeed general inflammatory disease; and that general influences,—such as febrile action, or the constitutional effects of medicines,—may tend to develop local inflammation where there is, either hereditary or acquired predisposition to such local affection; and finally, that the constitutional condition and natural predisposition of the patient should receive special attention, where inflammation is present or to be apprehended.

Inflammation appears to be a peculiar effort of the system to repair injuries resulting from violence or morbid influences, and to rid itself of disease. Even where local inflammation supervenes upon a general disease, as malarial fever, I regard it in this very light; and I hope to be able, in the progress of our discussion of this subject, to prove to your satisfaction, that the legitimate tendency of inflammation is the repair of structures, and the restitution of the system to health, I hope to prove this from the well

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known condition of the organs under its influence, as well as from the best authorities; and although inflammation may result in the destruction of an organ, and even in the termination of life itself, it is only an instance in which the method of nature has been incompetent to, or has been prevented from, the accomplishment of its end.

RESULTS.

The *results* of inflammation are various and peculiar, yet capable of being classified in a manner which has great utility, in enabling us to comprehend the nature and tendency of this form of disease. The variety in the results of inflammatory action, is caused no doubt, by differences in different cases in regard to the condition of the system at the period of the disease, and the character and morbid force of the cause that produced it. This is remarkably exemplified in the great facility and rapidity with which some individuals recover from the most extensive and serious accidents, while in other cases the most trifling injuries are followed by serious, and often fatal results. The condition of the blood has the most important influence upon both the character of inflammatory action during its progress, and the results which may be produced by it.

The *results* of inflammatory action, denominated by some of the modern authorities its *terminations*, are numerous; and though differing very widely in different cases, they all tend in a greater or less degree to impair the organized tissues, or destroy their healthy action. Each however is attended by its own peculiar symptoms and train of phenomena; and each is characterized by its own specific changes in the vessels and structures involved, differing essentially from those pertaining to any of the others.

Resolution. The most simple, and where circumstances are all favorable, the most natural result of inflammatory action, is a gradual decline of all the abnormal appearances, with a restoration to healthy action. In this case, the pain diminishes, the swelling subsides, the general fever declines, and all the other symptoms gradually disappear; and the part affected being wholly restored, regains its natural color, form and functions. This is termed by authors, *Resolution*, in which there is no formation of pus, and no permanent injury to the structure of the part. Where resolution occurs, it is in reality a "termination" of the inflammation.

Effusion. Another result of inflammation is, where some of the

elements of the blood are discharged from the vessels into the surrounding cellular tissue, or from the surfaces of serous membranes into the cavities lined by them. In some cases, this effusion consists really of blood, either in a state of decomposition, or deprived of its plastic qualities, so as to be rendered unfit for circulation in the minute capillary vessels,—as the black vomit in yellow fever, and the bloody evacuations in dysentery; though in the latter case, it is accompanied by a mucous secretion. Whether this effusion of blood is accomplished by a sort of secretory process, or by exudation through the relaxed tissues of the mucous surface, it is not necessary to discuss at this time.

Induration and Adhesion. Inflammatory action, occurring in the cellular structure, is accompanied by more or less swelling; and not terminating in resolution, there is effusion of serum and lymph, not unfrequently increasing the tumefaction by the organization of new living tissue. Where this is the case, and the cellular structure is very loose, the inflammation has a tendency to become chronic, and result in *induration*. But by the same process precisely, where the effusion occurs between the serous surfaces of membranes, such as the pleura, peritoneum, synovial capsules, etc., or between artificial surfaces, as of wounds, the coagulating lymph becoming organized, interposes a new organized substance, which forms a bond of union between the opposing surfaces. This effect is called *adhesion*. By this mode, nature repairs those injuries which result from a destruction of continuity of structures; and by this same mode, she surrounds inflammatory action with a barrier to limit its extent, in many cases; and it is an interesting fact, that generally in the cases last mentioned, the newly organized structure is removed by absorption, after the disappearance of the morbid action, which both rendered it necessary and effected its production. Sometimes however the new growth remains as a permanent structure, after all other traces of inflammation have disappeared; especially in adhesions of serous surfaces.

Where the effusion following inflammatory action is but slight, the restorative powers of the system are usually sufficient to dispose of it, without any serious lesion; perfect and complete recovery follows, and few, if any traces of previous morbid action can long be seen. This however is not the case in all inflammatory diseases. In acute rheumatism for instance, where a high degree of inflammation is supposed to exist in structures of a low grade

I have already stated that *induration* often follows effusion, and perhaps this can not be more aptly illustrated, than in those cases of chronic inflammation of the liver and spleen, so often found in this western country. Enlargement of these organs is not the result of a mere accumulation of blood, but an effusion of serum in the cellular structure. We find the same thing to occur very frequently in the skin, where inflammation is followed by induration of the dermoid tissues; and the same result is often produced by inflammation of the lymphatic glands. Protracted venereal disease, will generally produce induration of lymphatic glands of the groin, and other parts of the system.

Suppuration, or the formation of *pus*, is another result of inflammatory action. A great difference is found to exist in different tissues, as to their tendency to the formation of pus. The loose structures, and those less highly organized, are more liable, as a general rule, to form pus under the inflammatory process, than those tissues which are more dense, and which have a higher grade of organization. This product of inflammation is very different in character also, in the different tissues and organs; each of these has a tendency to yield a peculiar kind of pus. In the cellular structure, this matter is yellow or greenish-yellow, and somewhat consistent, having the thickness of cream; and when it occurs in a healthy or sound state of the constitution, it is called "*healthy, or laudable pus*," tending to the restoration of the part to a healthy condition. In the serous tissues, the matter is more thin and watery. In the parenchymatous structure of the liver and spleen, the pus produced bears some resemblance in color to the organs or parts in which it is formed. Suppurative action does not frequently occur in serous membranes, but is very common in the loose structures of the mucous membranes, and in the sub-cutaneous areolar tissue.

When this result has occurred, it may generally be known by the rounded, tumefied, smooth and shining appearance of the part; by its becoming less painful, with a decline in the general febrile excitement which may have existed; and by a distinct sensation of fluctuation, upon proper examination. To determine the existence of matter, is often a subject of some embarrassment to the young physician; but by placing the palmar surface of the fingers on one side of the part supposed to contain pus, and with the fingers of the other hand making a gentle tap to the opposite side, or, which is a better method, applying gentle but sudden pressure

with the fingers a few times alternately on opposite sides of the tumor, the wave or fluctuation may be distinctly felt, if pus be present.

[*General characters of Pus.* There is considerable variety in the substances that are usually included under the name of pus. The true representative of this matter is that referred to by Prof. Jones as "healthy, or laudable pus," and described by some writers as *true* or *genuine*, in contradistinction to what they denominate *spurious* or *false pus*.

True pus is semi-fluid, opake, and of a pale yellow or greenish-yellow color. It is not tenacious like mucus, although in color and consistence it resembles the latter substance, but may be poured in distinct drops. It is heavier than water, having a specific gravity of 1030 to 1033. It is miscible with water, but upon standing settles to the bottom in the form of an opake, light-colored sediment, consisting of pus globules. It is commonly neutral, but occasionally either acid or alkaline.

The characteristic element of normal pus consists of minute globules, spherical in form, granular in structure and differing so little from mucous corpuscles in general appearance, that it is very difficult to distinguish the one from the other under the microscope. Their average size is about $\frac{1}{2000}$ of an inch, so that it requires a microscope with a magnifying power of fifty diameters, to render them distinctly visible, and of three hundred and fifty or four hundred diameters, to demonstrate their peculiar granular structure. Their color is so pale that it is scarcely perceptible unless several are collected together. These minute bodies float freely in the *liquor puris*, which is not tenacious and ropy like the fluid portion of mucus, and which therefore presents the principle distinction between the two fluids. This *liquor puris* very nearly resembles the serum of blood, but contains a peculiar compound called *pyin*, which is said to be a tritoxide of protein, is soluble in water, but precipitated by acetic acid. The other constituents are albumen fat, extractive matter, and inorganic salts, principally chloride of sodium; phosphate, sulphate, and carbonate of soda, chlorides of potassium and calcium, phosphates of lime and magnesia; and a trace of peroxide of iron.

Origin of Pus. The opinion once prevailed that pus was merely transuded blood deprived of its coloring matter; but the microscope has shown the impossibility of pus globules which are more than one-third larger than red blood-cells ever escaping from the

blood-vessels without a rupture of those vessels. The most satisfactory explanation appears to be that it is secreted from the capillaries in the form of a fluid; that this fluid is the fibrinous coagulable lymph, which possesses a tendency to organization; that the minute granules become aggregated in the form of what are called *exudation corpuscles*; a portion of three corpuscles may form the basis of granulations, in the process of repair, if granulation is taking place, while the rest, failing of further organic development, degenerate into the true pus corpuscle. If it should be asked, what causes the process of development to be arrested if the pus globules have their origin in a commencement of vital organization? The only answer that can now be given is, that the molecules of coagulable lymph can not become organized into living cells except in immediate contact with living tissue, and that the rapid formation of successive crops of corpuscles on the secreting surface, necessarily separates preceding ones from that surface, without allowing time for their organization to be completed. S.]

While speaking of the effusion of coagulating lymph, I had occasion to describe, with perhaps sufficient minuteness, those structural changes, which result in an increase in the quantity or density of the living tissues, called adhesion and induration. Other structural changes also result from inflammatory action, differing very widely from those just mentioned; being characterized by diminution of vitality and consequent approximation of the tissues to the character of inorganic foreign matter. These results of inflammatory action are expressed by the terms *softening*, *ulceration* and *gangrene*.

Softening, to a certain degree, may be said to be almost a necessary consequence of a high grade of inflammatory action; the engorgement of the vessels and interstitial effusion which produce tumefaction, tend necessarily to diminish the natural cohesion of the tissues, and render them more easily separable than in health. As inflammation progresses, this change of structure increases, until sometimes the tenacity of the textures becomes so much diminished that they will break down under the application of slight mechanical force. Indeed it occasionally results in the total disorganization of a portion of the structure, which is either removed by absorption, or is discharged with the purulent secretion. Where softening proceeds to the degree just described, a suppurating

surface is generally left entirely similar to that produced by the removal of a gangrenous slough, or the discharge of an abscess.

Ulceration depends upon the process of what is denominated interstitial absorption, by which such portions of a structure are removed, as have been so far deprived of their vitality, as to be incapable of resisting the power of the absorbent vessels. Where this occurs at the surface of an inflamed part, free or open ulcers are produced; but when it takes place in the interior of an organ, it produces an excavation, which may serve as a receptacle for pus; and the process of *ulcerative absorption*, as it is termed, being continued, generally in the direction of the surface of the body, a way is thus provided for the discharge of purulent matter. In this case we have what is called an *abscess*, which differs from a superficial *ulcer*, only in having a deeper origin—being produced by the same process.

There can be no doubt that ulceration results, as has been said, from the destruction of vitality in the tissues, to a certain extent, by the inflammatory process, which renders them incapable of resisting the action of the absorbents, and they are consequently dissolved and carried into the circulation. Such portions of the devitalized matter as are not thus taken up, are discharged in the form of unhealthy pus.

Gangrene implies the death of a part, to a greater or less extent. This is the most formidable result of inflammatory action, but fortunately it is the least frequent in occurrence. Some authors make a distinction between the terms *gangrene* and *mortification*; using the former to denote the condition of a part immediately preceding its actual death; and the latter to express the state of a structure after its vitality has become entirely extinct. [The profession generally however, now use the three terms *mortification*, *gangrene*, and *sphacelus* as nearly synonymous in meaning. The first expresses the change that has occurred—loss of life—the other two designate the state of the dead part. S.]

The symptoms denoting an approach to gangrene are, a change of color to a purplish or livid hue, owing to the languor of the capillary circulation; reduction of sensibility in the part immediately threatened, though very intense pain may be experienced, with a sense of burning in the associated structures; a diminution of temperature; loss of tension and elasticity in the part, giving it a sort of doughy feel; and a clammy moisture, generally, upon

the surface, caused by the transudation of serum from the vessels. The circulation finally ceases altogether in the part, its sensibility is entirely lost, the color becomes more dark and livid, and a red line is formed, indicating the extent to which death has occurred. Chemical changes now commence in the sphacelated portion, fetid gases are emitted, with other evidences of spontaneous decomposition. This is termed putrefaction, and whatever doubts may have existed as to the occurrence of mortification, they will be completely removed upon the appearance of the putrefactive phenomena.

Gangrene may with more propriety, perhaps, than any of the results of inflammation except resolution, be denominated its termination, as the inflammatory action does of course cease in the dead structure; but this is not the case in adjacent tissues. As has been said, a red line, defining the boundary of the mortification is seen, ulceration occurs, and the gangrenous portion is thrown off in the form of a slough, leaving a surface in which the inflammation may progress, resulting in successive sloughings, and finally in death; or granulations may be formed and the part be restored to health. Besides, inflammation is not a necessary forerunner of this condition; for by what is termed *dry mortification*, the death of structures may occur, without the appearance of any inflammatory excitement. So that in neither point of view, can we with propriety designate gangrene, or mortification, as a *termination* of inflammation.

The fact is, that the usual mode of expression among authors, by which inflammation is represented as having a certain number of terminations, from three up to ten or eleven, according to the fancy of the writer, has produced much confusion, and rendered the subject very difficult of comprehension to students. The phenomena which have been thus designated are truly results of inflammatory action, but their occurrence does not, by any means, imply a termination or cessation of the morbid action. Neither can the term be properly employed as indicating a special tendency of particular forms or grades of inflammatory action to result in this, that, or the other termination.

Gangrene itself, we have seen, is usually accompanied by ulceration; and *suppuration* may follow, *granulations* be formed, and the lesion be healed by *cicatrization*. Yet each one of these is laid down in the books as a *termination* of inflammation, acute or chronic.

Granulation is a process of repair, by which the loss of structure is partly or wholly supplied and a healthy condition restored in parts which have suffered from the effects of ulceration, suppuration, or mortification. It is effected by the effusion of coagulable lymph upon the diseased surface, which becoming organized, forms a new surface, composed of small, red, vascular and conical elevations. Upon this surface a new effusion and organization takes place, and so on, until the process of repair is completed. This process, when proceeding kindly, is attended by the secretion of healthy pus, which lubricates and protects the delicate and tender granulations; and there is a slight elevation of temperature, indicating that the process now going forward is truly an inflammatory one, though tending to restore the injuries resulting from the previous march of inflammatory action.

There is a tendency in granulations when in contact to unite and form a continuous structure. Thus it is that the surface of a part will be finally rendered smooth by the union of adjacent granules and their final coalescence; and by the same means two granulating surfaces, when in apposition, unite by what surgeons call the *second intention*. The only difference between this mode of union and that by *first intention*, is that in the latter case the coagulating lymph forms a bond of union which cements the incised surfaces together, so to speak, without the formation of pus, or granulations, while in the latter these processes are necessary to fill up the space between the two surfaces. But both are effected through the interposition of coagulating lymph, under the power of the vitalizing principle.

This mode of repair, by which a part is restored to a more or less perfect form and structure, is termed *cicatrizization*, and the remaining scar or trace indicating the existence and location of previous lesion, is denominated a *cicatrix*.

I have now given you an account of the various recognized results of inflammatory action. They may thus be recapitulated: 1, resolution; 2, effusion of serum; 3, deposition of lymph; 4, suppuration; 5, adhesion; 6, induration; 7, softening; 8, ulceration; 9, gangrene; 10, granulation; 11, cicatrization. An example of all these results of inflammation may be seen in a severe boil, and more particularly in the carbuncle. In the center, or core, we have a *slough*, or *gangrene*; this is separated from the walls of the cavity by *absorption*; this is followed by *suppuration*. Further from the center there is *effusion*; still further, organized *lymph*, or *adhe-*

sion. The structures of the tumor are more or less *softened*, while a degree of *induration* will remain often for a long time after the inflammatory excitement has passed away. The center of the boil or carbuncle will heal by *granulation* and *cicatrization*, while the inflammation in its border will subside by *resolution*.

PECULIARITIES IN DIFFERENT TISSUES.

I will now briefly notice the peculiarities observed in the inflammatory process, according to the tissue in which it occurs. It is true that the general outlines of inflammation are similar in all parts of the system, sufficiently so at least to enable us to recognize the affection wherever observed as belonging to this genus. Still there are peculiarities in the phenomena developed by this sort of morbid action in different tissues of the body, which have led to an arrangement of inflammatory disease into what might, perhaps with some propriety, be termed species; and it is important to give some attention to this view of the subject.

In the *cellular* or *areolar* tissue, inflammatory action exhibits more uniformly than in any other, all the symptoms and results characteristic of this form of disease; and consequently its course and phenomena in this tissue have been taken as the type of inflammation. When it occurs near the surface in this tissue it produces a tumor or boil, technically called a phlegmon, from its color and heat; and from this the term *phlegmonous* has come to be applied to ordinary inflammation in all parts of the body.

The disease in this tissue is apt to surround itself with a barrier by adhesive inflammation, and thus produce a circumscribed abscess; but occasionally it diffuses itself very widely, producing wide-spread havoc in the cellular tissue by a sort of softening, or gangrenous suppuration. When the *skin* is involved in this form of diffused inflammation, it is called *erysipelas phlegmonodes*.

Common inflammation in this tissue is attended usually by an aching pain, which becomes throbbing when suppuration is about to occur; there is apt to be much swelling and local heat, though but little general febrile excitement. Hence, when some vital organ is suffering from inflammation of its areolar tissue, the danger is often far greater than outward or general symptoms indicate, while in some other tissues very slight and in itself unimportant inflammation, may produce very marked general febrile symptoms.

As was shown, in the case of a boil, this species of inflammation may be characterized by all the results of inflammation in a

single case; or it may eventuate in resolution without progressing so far as to destroy the continuity of any structure. Effusion of serum and deposition of lymph are seldom wanting in areolar inflammation.

In the *serous tissue*, inflammation is characterized by an acute, severe pain, generally; and by an inflammatory or sympathetic fever, upon the peculiar symptoms of which it is not necessary now to dwell. Effusion is its most usual result, though most or all of the effects of inflammation may be produced in this tissue. Adhesion of opposing serous surfaces is not an unfrequent event, as was stated while speaking of coagulable lymph.

In the *dermoid tissue*, inflammatory action assumes a great variety of forms, and from its exposed position, it is peculiarly liable to such irritating causes as are likely to result in morbid excitement. It is subject also to many specific inflammatory affections, symptomatic of general disease,—as the exanthemata of certain fevers, and to erysipelas, in its several forms.

Inflammation of the *skin*, as resulting from the effect of a local irritant, is distinguished by a peculiar, burning pain, by a bright red flush, generally some swelling, and a sensible increase of heat. It may subside speedily by resolution, but if continued, serum is effused beneath the cuticle, producing what is called a blister; the inflammation may progress from step to step, and exhibit all the results before described. Gangrene is as frequent an event in cutaneous inflammation as in that of any other tissue.

The *mucous tissue* is in reality only a continuation, with some modification, of the external integument, and like it possesses sympathies with the entire system to an extent which renders it peculiarly liable to be implicated in the affections of other tissues. It is furthermore exposed to the irritating action, both mechanical and chemical, of all uncongenial substances which may be swallowed, or formed within the viscera which are lined by it. The pain experienced in an inflamed mucous membrane is of a smarting or stinging character, as in the eye in ophthalmia, inflammation of the urethra, etc. But little pain is experienced in the mucous coat of the stomach and bowels—the gripings in dysentery, and spasmodic pains which sometimes occur in gastritis, being the result of irritated and spasmodic contractions of the muscular coat. Hence, between the muscular efforts, as between the discharges in dysentery, the patient is generally exempt from pain. An inflamed mucous surface may exhibit any shade of floridity, from

a slight flush to a dark red or reddish-brown, owing to the intensity and duration of the morbid action; and it is generally more or less thickened. The inflammation may terminate by resolution, or it may eventuate in softening, ulceration, suppuration or gangrene. It is generally characterized at first by increased mucous discharges; the inflamed surface then becomes dry, or at least is not moistened by any secretion of its own; afterward, fluids, as vitiated mucus, with serum or blood, or both are discharged; and finally, if the disease progress, pus will be thrown out from the inflamed part. These peculiarities, marking the different stages of the affection, are usually clearly observed in the expectoration during bronchitis, and in dysenteric evacuations.

The *cartilaginous* and *fibrous tissues*, under which terms I intend to embrace all the forms of cartilage, and of tendinous, ligamentous, and fibrous structures—such as the dura mater, periosteum, and animal substance of bones—are liable to inflammation, but less so than other tissues. The affection in most instances, when occurring in these structures, presents the symptoms of rheumatism or gout. Although these tissues possess little or no sensibility during health, in disease they may become exquisitely sensitive, and the inflammatory action is generally characterized by a continued gnawing pain. The affection may assume the highest grade of morbid excitement, exhibit all the phenomena of inflammation, and result in death of the part, or gangrene. The march of the disease is generally slower than in other structures, but it may be none the less destructive. It is true, as stated by authors, that tendons, etc., resist to a considerable extent the process of gangrene, even when it occurs in structures in immediate contact with them, but it is not true that either or any of these tissues is exempt from gangrene. I have seen an entire limb, tendons, ligaments, bone and all, come off in a slough. *Necrosis* is a result of inflammation in the bone, where the whole bone, and *exfoliation* where its surface only is involved, which I can not distinguish from mortification.

The rheumatic variety of inflammation rarely produces destruction of structure in any manner; its most common result is effusion.

LECTURE XVII.

INFLAMMATION — CONTINUED.

Chronic Inflammation; General Effects of Inflammation on the Blood; Hunter's Opinion; Gendrin's; Buffy Coat; Nervous Influence; Fibrin; Effects of Inflammation beyond its Seat; Sympathetic Fever; Microscopic changes in Inflammation; Contraction of Capillaries; Relaxation; Engorgement; Effusion of Lymph; Quotation from Tweedie, From Hunter, From Magendie, on Capillary Circulation.

CHRONIC INFLAMMATION.

Having defined the term, *inflammation*; described its general symptoms and results as developed in the parts immediately involved; and noticed the peculiarities which characterize it in different tissues; we will on the present occasion, inquire more particularly into its influence on the blood; its relation to the general system; and the minute changes which occur, during its progress, in the capillary system, as discovered by microscopic observations.

You observe, gentlemen, that I have laid out pretty broad grounds for consideration this morning; grounds embracing matters of great practical importance, and principles which involve the philosophy of a vast range of human diseases. But before proceeding to the discussion of the subject in this light, I will make a collateral remark or two, upon the division of inflammation into the acute and chronic varieties, as recognized by the authorities.

In *chronic* inflammation, the same phenomena may be said to occur, with all the changes, and most of the modifications which characterize the *acute* form, as presented in the lecture of yesterday; the main difference consisting in the slower march, and more protracted duration of the former; owing to difference in the intensity or continuance of the exciting cause, and perhaps to the

influence of peculiar states of the general system. Every conceivable grade of violence is observed in the inflammatory process, as we examine different cases, according as the cause and constitutional condition seem to favor a slower or more rapid progress; so that authors have even introduced another term indicating an intermediate grade—the *Subacute*; but the distinctions thus attempted to be made, are not based upon real physiological or pathological differences, and are consequently of very little practical importance.

EFFECTS ON THE BLOOD.

We have heretofore considered inflammation mainly as a mere local affection; but although its observable phenomena are local in their character, yet the disease generally exerts important influences upon the blood, and upon organs remote from the immediate seat of the morbid action, and not directly connected with it; so important indeed as to demand more attention and create more concern than the primary disorder.

As to the character of those sensible and apparent *changes in the blood*, which are observed to be the usual attendants on inflammation, there is no room for difference of opinion; but the cause of those changes has given rise to no little discussion. For instance, all agree that inflammation, under most circumstances, is associated with a condition of the blood, which is indicated by a peculiar appearance on the surface of that fluid, when drawn from the system and permitted to coagulate, called the “buffy coat.” This is a whitish or yellowish-white, and sometimes greenish stratum, which is formed upon the upper surface of the blood, during coagulation, which all authors recognize as consisting principally of fibrin; but in regard to the cause of its appearance under such circumstances, much difference of opinion has been expressed. Hunter attributes it to the slower coagulation of inflammatory blood, allowing the red corpuscles to subside by force of gravity before the clot is formed. Gendrin, on the other hand, asserts that the coagulation of blood affected by inflammation commences sooner, and is sooner completed than that of ordinary or healthy blood. Here then we have two opinions, founded, as they both remark, upon their own observations, which are in direct conflict as to a fact, in relation to which there ought to be no great difficulty in arriving at the truth. It is not, therefore, surprising that authors should differ in regard to the cause of the change in the

nature and constituency of the blood, by which it is disposed to coagulate in this peculiar manner.

The influence of inflammation, in affecting the alteration of the blood throughout the system, is by no means uniform. The buffy coat will not always appear on the blood of inflammation; and it does undoubtedly sometimes occur in blood drawn from systems in which no inflammation existed. Hence, although this peculiar condition of the blood generally makes its appearance under the influence of inflammatory action, it is a question whether the change is effected by the direct agency of the local disease, exerted upon the blood as it passes through the capillaries of the inflamed part, or whether it is a secondary result dependent upon a peculiar condition of the nervous system, which although generally brought about by the inflammatory process, may exist independently of it.

This last view of the subject is rendered very plausible by the fact, that although the system may be enduring the most intense inflammatory action, the blood first drawn does not always present the peculiarity referred to; but if sufficient blood be abstracted to relieve the patient from the oppressive excitement, the buffy coat and "cupped" appearance will characterize it upon coagulation. It would also appear to be more constantly manifested in those inflammatory conditions connected with disease of synovial membranes, where the inflammation itself depends on constitutional disturbance and a vitiated condition of the blood.

This view of the case is greatly strengthened by the undisputed influence of the nervous system in producing serious alterations in the circulating fluid, as evinced in those destructive epidemics of the South and West, such as congestive, pernicious and yellow fever; in which the blood is often found in a decomposed condition evidently referable to the enervating influence of the poison upon the nervous system.

[The buffy coat is caused by coagulation of fibrin on the surface of the clot. This may take place under very different states of the blood. If the serum is dense, the red corpuscles do not settle rapidly to the bottom, and in that case, though there were an access of fibrin, it might coagulate before the corpuscles had time to subside. They would therefore be involved in the upper stratum of the coagulum and give it the dark color; in other words, prevent the appearance of a buffy crust. On the other hand when the serum is rare, the corpuscles settle rapidly before coagulation commences, leaving the fibrin to coagulate in the serum above, and as

that portion of the coagulum then contains but a small portion of the colored corpuscles, it forms a light-colored surface or buffy coat upon the clot. This may occur when the blood is even deficient in fibrin. The buffy coat is not therefore conclusive proof of an increase of fibrin, nor of the existence of inflammation in the system. S.]

The most manifest influence which inflammation exerts upon the blood, as determined by analysis, is manifested in the *increase of its fibrin*. This it is said, is uniformly augmented in quantity during the progress of inflammation, commencing from the first establishment of this abnormal excitement, and diminishing as it declines. The elements furnishing the materials for this sudden increase of fibrin are supposed to be derived from the albumen of the blood, as that particular constituent is said to be sensibly diminished.

This increase of fibrin in the circulating fluid, illustrates the wonderful resources of nature for accomplishing the purposes of the animal economy. The best experiments have shown that a due proportion of fibrin is indispensable to the free circulation of the blood in the capillaries, and that a deficiency of this element is attended by obstructed circulation in some of the vessels, even in ordinary health, while in inflammation, we have positive obstruction in the vessels of the inflamed part, as shown by very careful microscopic observations. Admonished of this fact, nature, with her wonderful resources and skill, sets about the work of removing the obstruction and repairing the injury. As the best means for the accomplishment of these purposes, an immediate supply is afforded of that element which is best adapted to promote freedom of circulation in the obstructed vessels, and furnish the materials necessary for repair; and this supply is continued until the inflammatory process subsides, when this particular element is gradually reduced to its normal proportion. These facts also conclusively demonstrate the proposition, that the general symptoms of inflammation result from the efforts of the system to remove disease.

[Another effect of inflammation, which occasionally occurs, is a relative increase of white corpuscles in the blood. This is always concurrent with a diminution of the red cells, and is probably caused by diminished development of the latter rather than by increased production of the former.

The condition of the red corpuscles is generally so modified during inflammation, that instead of gliding freely over each

exploration was made, the symptoms were so remarkably persistent and obstinate, as not to be amenable to medication. But when the source of the difficulty was discovered, and appliances adapted to the removal of the real disorder were employed, the symptoms yielded with great promptness, and perfect relief followed.

The influence of local inflammation in the production of general febrile action, is so well known, and will be so often a subject of consideration, when we shall speak of particular affections, that it is unnecessary to dwell upon it at this time. A few words however, in relation to the immediate cause of this sympathetic fever, may not be out of place in this connection.

In using the term *sympathetic fever*, I do not now include those febrile phenomena which result from malarial and other similar causes; although, in one sense, all febrile action might be considered sympathetic; but I apply the term only to such general febrile symptoms as result from some appreciable local lesion.

Whether the immediate causes of those febrile symptoms associated with the local phenomena of inflammation, are referable to derangement of the blood, resulting from preëxisting irregularities, hereditary tendencies, or accidental and unavoidable circumstances; or whether it is at first produced by derangement of the nervous functions from causes not apparent, are questions which can not be very readily nor satisfactorily determined, in the present state of our knowledge. The controlling influence of the nervous system in the phenomena of animal life, and also in the production of morbid action, is fully recognized, and seems to distinguish it as the guardian of the citadel, and subject almost necessarily to receive the first morbid impressions. But since the very first sensible manifestations of sympathetic fever are observed in the secretions, denoting an effort of nature to throw morbid elements out of the system; and since the source of such unhealthy materials can be the blood alone; it seems equally evident, that derangement of this fluid, if not the primary difficulty, is at least an early associate of the first phenomena of sympathetic disease.

The progress and complications of these febrile symptoms will depend, as a matter of course, on the character, extent and state of the local disease; developing different combinations at different stages of the primary affection; which will be discussed when we come to speak of disease of the particular organs.

MICROSCOPIC CHANGES.

I will in the next place, call your attention to the *minute changes* which characterize inflammatory action, as ascertained by the microscope. Many careful observations, and critical and extensive experiments, have been made in this department of pathological research, with a view of detecting the changes which occur, and the peculiarities of condition which exist in the minute vessels and tissues, during the inflammatory process. To this subject I bespeak your most careful attention, for upon the nature of inflammation as thus determined, and upon the effects which the loss of blood produces on the circulation of that fluid in the vessels, we predicate the philosophy of correct treatment in active inflammatory disease. These changes and peculiarities, too minute to be detected by unassisted vision, have been brought to view by the powers of the microscope; and the observations made with this instrument are so various and extensive, and have been so often repeated, under a great variety of circumstances, both upon the lower animals, and upon the human system, that there appears to be here no longer any room for doubt or uncertainty in regard to the truth. I shall not however, attempt to give you in detail all the experiments, observations and minute facts, which have been recorded by those who have been prosecuting such researches, but in a summary manner state those results, in regard to which there is a general coincidence in the experiments made by different individuals.

First then, all experiments prove that the earliest observable changes which take place in parts exposed to a cause of inflammation, are always essentially the same, whether that cause be local or general; whether it be from constitutional influences, or extraneous irritants; and whether the irritation be produced by mechanical violence or chemical action. The first observable change in a part thus exposed, is a contraction of the capillary vessels, or a diminution of their caliber, which must of course be attended by increased activity of the circulation in them; for the channels being made smaller, the current must be more rapid. This it may be observed, is the mere initiatory stage, and does not denote the actual existence of inflammation, but as it were, a process preparatory to the development of positive inflammatory action. Should the morbid excitement be arrested without progressing further, the affection could not be called inflammation, but merely irritation,—although this stage is an indispensable step in the inflammatory process.

This constricted state of the vessels is followed by a relaxed condition. They now begin to enlarge and become distended in a sensible degree, while the movement of the blood in them becomes slower. These phenomena denote the development of positive inflammation, and in direct ratio with the increase and intensity of the inflammatory symptoms, are the relaxation of the vessels and retardation of the circulation, even to the effect of entire stagnation. At the very center of the inflammatory action, a complete cessation of the circulation occurs, which causes the part to assume the pointed or conical form. Often during this stage there is observed a retrograde motion in the circulating current. Whether this results from the obstruction at a certain point, damming up the vessels; whether it is caused by effusion from the vessels, tending to produce a vacuum, and thus inducing a backward flow of the blood to re-fill the vessels; or whether it results from chemical changes in the blood, producing such new affinities as to cause the blood to flow back under the influence of attraction upon its particles, is not fully determined; but such are the perceptible facts; there is a manifest oscillatory motion in the capillary circulation of the part involved, during this stage of inflammatory action. Nor are these peculiarities of movement the only changes observed in the blood. The red globules which hold so important a relation in all healthy action, lose some of their peculiarities of form, and exhibit a tendency to coalesce, often as it were running together, forming masses of globules, which evidently tend to interrupt the circulation. This is doubtless attended by great modification in the vitality of this important element of the blood. If however, the inflammatory process be here arrested, either by efforts of nature alone, or assisted by proper treatment, so that this condition is not permitted to continue long, the globules seem to possess the capacity of resuming their vitality and individual identity, even where the latter appeared to be entirely lost. It has been supposed by some that they possess a kind of individual life, and that each little molecule has a kind of repelling force with which to resist morbid influences, and that when in their individual capacity, this power is insufficient for the purpose, they arrange themselves in platoons or armies for the purpose of increasing their resisting force; and that when the invasion is ended, their alliance is dissolved, and a disbanding of forces takes place. This may be called the refinement of theory, yet it is worthy of serious consideration.

Simultaneously with the occurrence of the changes just described, there occurs an effusion of lymph from the vessels into the cellular structure of the affected part. This exudes or passes out through the pores of the vessels, in a fluid condition, and afterward becomes solidified by coagulation, and the absorption, probably, of the fluid portions. In this new substance, which has the organic structure characteristic of coagulated fibrin, there is soon observed a transmission of colored fluid, probably pure blood; which by virtue of its vitality (a very unmeaning term, however, as I have before remarked), or by the power of the blood-vessels, or by the action of the heart (which is felt throughout the system), is forced into this coagulated matter, the particles of which, by some vital instinct, as I may call it, are attracted around the blood corpuscles and thus form an entirely new set of vessels. This extra accumulation of blood gives to the surrounding parts the great increase of redness so common in inflammation; and this color and the tumefaction produced by the formation of the structure, may remain long after the disappearance of active inflammatory symptoms, constituting a chronic inflammation, which may yield only to a long course of medication, and the slow absorption of the superabundant organic structure. The process by which coagulating lymph is thus converted into organized living tissue, is what we mean by the term *adhesive inflammation*. It cements the structures where vitality remains, and around the center where the circulation has ceased, and vitality is lost, it builds a barrier or wall, as if to resist the extension of death, while the increased vascularity of the part determines the circulation toward this devitalized center, which at last is separated from the living structure, as a slough, or is dissolved in the serous effusion and purulent secretion, and thus prepared to be discharged.

Such gentlemen, are the microscopic phenomena of inflammatory action. They are striking and peculiar as characteristic of this form of morbid action, and they are remarkable for their uniformity. True, the same effects are not always observed to follow the application of a stimulus, and the inflammatory action may be more promptly set up, and more speedily terminated in one case than another; yet the minute changes which occur in the structures and circulation, are substantially the same in every tissue and under all circumstances, so far as the microscope can reveal them; whether they are observed in the web of a frog's foot, in the peritoneum of a dog, or in the lungs of a human being. The

peculiarities of each inflammatory stage are always essentially the same in kind, however they may differ in extent or intensity.

As confirmatory of what I have said upon this subject, and as affording a more minute exposition of some of the microscopic phenomena than I can give you in any other form, I will here read you a few extracts from eminent authors. The first is from Tweedie:

“Immediately after the application of a stimulus which is capable of exciting inflammation—especially if it be one which acts on a large surface, as alcohol applied to a membrane—a constricted state of the small vessels of the part, and an accelerated flow of blood through them has been distinctly seen by various observers; but this state is of short duration, and during it the characteristic marks of inflammation are not perceived. After a time, varying from a few minutes to some hours from the first application of the exciting cause, the opposite change in the condition of the small blood-vessels is observed; they become enlarged and distended; the movement in those most affected is slower than before; there is often absolute stagnation for a time, and often oscillation, in different portions of them, and the globules of the blood which they contain are found to coalesce into irregular masses, in which their individual forms are no longer recognized. This is the condition of those parts in which the redness or swelling are the most intense. In the neighborhood the vessels are likewise enlarged, while the flow through them is more rapid than natural. Over the whole surface, and especially where the movement of the blood is retarded, many small vessels become obvious, which were not previously seen. This is, no doubt, chiefly owing to the reception of the globules of the blood into vessels previously admitting only its clear and colorless liquid; but Kaltenbrunner and others have distinctly observed the formation of new vessels, by globules escaping from the vessels and making tracks for themselves in the surrounding textures. It does not appear that either acceleration or retardation of the flow of blood is essential to the state of inflammation; and although the latter state is always predominant in the parts most severely affected, yet, partly in consequence of the accelerated flow in the neighboring vessels, and partly of the increased quantity of blood received, more than compensating for its slower progress through the most diseased parts, the whole quantity of blood returned by the veins from an inflamed part (as in the case of the hand) is found to be greater, and, when the

inflammation is severe, to be three or four times greater than that returned, within the same time, by the veins of the opposite sound organ.

“ Within a time, which is likewise various, but often very short, from the beginning of these changes, the characteristic effusions of inflammation begin to show themselves, *chiefly, perhaps solely, in those parts where the flow of blood is retarded*: first, the surrounding textures are loaded with a serous fluid; but, gradually, changes take place in this fluid, which indicate that other constituents of the blood have exuded from the vessels; or part of the fluid effused assumes a gelatinous consistence, and forms flakes or layers, which gradually become solid. In the semi-fluid matter first effused, according to Gendrin and others, decolorizing globules of the blood may often be perceived; and in many cases globules of pus—known by their larger size and freer motion on one another, and when observed in mass, by their yellow color, soon appear in this effused matter, and it assumes, more or less rapidly, and more or less generally, the form of purulent matter.

“ When the inflammation occurs in serous or mucous membranes, the first effusions from the blood-vessels go only to increase, and probably attenuate, the natural exudations from these surfaces; but as the inflammation advances, the fluid thrown out becomes always, as in other parts, of thicker consistence, as well as more copious than natural, and often more or less distinctly purulent.

“ Along with the semi-fluid lymph effused in the earlier stage of inflammation, there is often extravasation of the coloring matter of the blood, and sometimes of the entire blood; but most of the inflammatory exudation, in the cases to which we give the name of simple or healthy inflammation, soon acquires in most textures the appearance of the coagulable lymph or febrin, such as constitutes the buffy coat of inflamed blood. In this effused coagulable lymph it is very generally observed that canals are gradually formed, into which some of the capillaries of the inflamed texture soon effuse blood; these canals are, in the first instance, of larger caliber than the vessels which supply them, but soon contract and assume the appearance of vessels (chiefly of veins, when the inflammation is of healthy character), in which the motion of the blood goes on as in the vessels of other parts of the body, and by means of which this new texture of the body becomes liable to nutrition and absorption, like any of the preëxisting textures. It is thus that the permanent adhesion of inflamed surfaces, and the closing of wounds,

whether by the first intention (as it is called) or by granulation, is effected; and that inflammation within due limits, becomes the grand agent in repairing injuries attended with loss of substance.

“On the other hand, the inflammatory effusions are always liable, in a greater or less degree, to the vital action of absorption; which, although very beneficial, and indeed essential to the final disappearance of the disease, very often, in the more advanced stages, extends irregularly to the surrounding textures, and goes on to an extent which is not required for any useful purpose; and it is in this way, chiefly, that inflammation becomes a cause of that irregular breach of substance in the solids of the body to which we give the name of ulceration.

“Lastly, when the inflammation and consequent effusion have lasted some time at any texture, it often happens that the parts chiefly affected gradually lose their sensibility, change their color to gray, purple or black, become soft and flaccid, and ultimately putrid—their circulation gradually ceasing, and all their vital properties being extinguished. This is the termination in gangrene or mortification, often attended by suppuration and ulceration along the edges of the mortified part, which effects its separation from the living by the process called sloughing; while in other cases (as in what has been called traumatic gangrene), no such process is established to limit the extension of the gangrene, and it is arrested only by the death of the patient.

“These obvious changes are attended with less striking, but equally characteristic alterations, in the blood which passes through the inflamed parts. Not only do the globules coalesce into irregular masses, but much of their coloring matter separates from them (*Gendrin*); not only does the liquor sanguinis, or clear fluid of the blood, exude from the vessels, but it comes forth more loaded with fibrin than natural, so as to deposit much of it in the solid form, when at rest; and this effused fibrin appears to have a peculiar firmness of aggregation, for when it exudes on the inner surface of blood-vessels, where a current is going on, although fluid in the first instance, it is not carried off by the stream, but ‘concretes upon, and furs over, the inside of the vessel.’ (*Hunter*.) And not only does much of the effused fluid often gradually take the form of purulent matter, but the same change has been distinctly observed to take place on portions of the blood contained in the inflamed vessels themselves. (*Gendrin*.)

“These local changes are always observed to extend, more or

less, from the point where they commence, before subsiding there. This extension takes place in a much greater degree in some varieties of inflammation (to be afterward mentioned) than in others; but in all cases, two important observations may be made on the extension of inflammation: first, that it is more apt to take place along the texture where it originates, than to cross from one texture to another; and, second, that it usually takes place from the original point, as from a center, in all directions, not following the course either of vessels or nerves, and often passing from one portion of a membrane (as the pleura or peritoneum) to another portion lying contiguous to it, although the vessels and nerves of this portion may arise from a distinct source." * * * *

The same author, after presenting his reasons for rejecting the theory that inflammation is the result of mere mechanical obstruction of the capillaries, remarks:

"It will be observed that these considerations are well founded, not on speculation, but on observed facts, at least equally well-ascertained, and equally guarded from fallacies, as any that can be observed in experiments on animals. To leave them out of view, in forming an opinion of the nature of inflammation, is to reject, not the aid of hypothesis, but the evidence of facts. We do not say that we explain these facts by saying that inflammation is a vital phenomenon, of which the explanation must be sought only in the laws of life; but we make the first step to the proper explanation, when we place the phenomenon in its proper class among the subjects of human knowledge; and from the facts now stated, we infer, with perfect confidence, that any mechanical explanation of the kind in question can only reach a part, and not the most characteristic part, of the phenomena of inflammation; and that, in this as in other instances, all attempts to resolve the most essential changes which go on in the living body, into the laws of dead matter, can only tend to perpetuate false views in physiology, and to draw us off from the proper point of view, in which the actions of living bodies should be regarded."

In one of Palmer's notes to Hunter on the Blood, it is said: "When the web of a frog's foot, or the transparent mesentery of a warm-blooded animal, is viewed in the field of a good microscope, and at the same time irritated, effects very different are observed to ensue in different cases; but in all instances where inflammation is well established the vessels are observed to be increased in number as well as size, and the course of the blood to

be much retarded. The evidence upon this point is so universal, precise, and satisfactory, as to render any detail on the subject quite unnecessary. * * * It would appear, however, that there is a great difference between actual inflammation and that precedent state of erubescence which is excited by slight stimulants, or which bounds the outer circumference of an inflamed part, a difference which has not always been attended to, and which in many instances has led to mistakes on this subject. At first the effect of stimulation is generally to contract the small vessels and to accelerate the circulation; but as soon as inflammation is unequivocally established, the circulation is invariably retarded. In severe cases, indeed, the retardation amounts to a complete *stasis*, although in the surrounding parts the blood is observed to flow with more rapidity than usual."

That you may the more clearly perceive the difference between these abnormal peculiarities, and those which characterize the healthy capillary circulation, I will now quote from Magendie on this latter subject. He says:

"We will now leave the subject of the venous circulation, and pass to that of the capillary system; and the change is a satisfactory one; for our existing knowledge of the capillary circulation is much more complete and accurate than our acquaintance with the general circulation. In the large vessels, we can only judge of the state of the internal currents of blood by the appearance of their walls; according as the latter dilate, contract, become curved, straight or elongated, we perceive that the former move with such and such velocity and energy; in fact it is by induction only that we are enabled to analyze its phenomena of progression. The thickness of the vascular tunics prevents us from directly inspecting the globules of the blood,—an obstacle which does not interfere with their examination in the capillary vessels, as, by the help of the microscope, we are enabled to follow perfectly well the displacements and oscillations of the colored corpuscule floating in the serosity. The sole difficulty in this branch of the system consists in devising rational explanations for the phenomena observed. I constantly, as you are aware, brought the laws of hydrodynamics to bear, in explaining the circulation in the large trunks; to the same laws I shall refer in our new investigation.

"The tenuity of the capillaries is, therefore, favorable, instead of being an obstacle to the examination of the course of the blood in their interior. Injection lends very feeble assistance in the

study of the capillary circulation: it can, at the most, do no more than give some anatomical notion of the material arrangements of the vessels themselves. The blood is not the only fluid that moves in the beautiful rete formed by their interlacement; there are certain organs and tissues into the capillary system of which that fluid does not appear to enter at all in the normal state; but if you push an injection into the vessels, it will penetrate into the canals wherein fluids of another description usually circulate, quite as well as into those in which blood is ordinarily found. Thus, when the material injected is well fitted for the purpose, and cautiously introduced, the serous membranes will become covered with vascular arborisations. Now the vessels you descry on its surface, when thus injected, were not during life traversed by blood; white fluids only were contained in them; but as these hold no opaque granules in suspension, their mode of circulation can not be accurately followed during life. The lymphatic capillaries have as transparent walls as the sanguineous, and yet what we know of the phenomena occurring in them is exceedingly limited. If you lay bare and examine a serous membrane, you can discover no circulation in the interstices of its tissue; nevertheless, that tissue is principally formed of infinitely minute tubes. You can not allege that there are no liquid currents in movement; the rapidity with which substances deposited on its surface are absorbed, gives you the proof of the contrary. When this system of white canals, in consequence of some morbid condition, comes into relation with the blood, a fluid hitherto unconnected with them, you may perceive myriads of vessels in the substance of the membrane. It is this change in the color of the circulating fluid that betrays its presence; so long as it remains diaphanous we are unable to study its course.

"I have already adverted slightly to the researches of M. Poiseuille respecting the capillary circulation. I have told you how that observer ascertained that the blood moves in the capillary vessels in the same manner as a liquid in an inert tube; in both cases a motionless stratum adheres to the inner surface by a sort of affinity. Its existence in vegetable tubes, also, has been established by the same experimentalist. Examine the course of the blood in a vessel spacious enough to allow of the passage of several globules abreast, and you will perceive that their velocity of movement is very great in the center, and less so in the neighborhood of its walls, while in the stratum of serum they are nearly

motionless. In the axis of the vessels the globules are only subjected to a movement of translation; in the neighborhood of the stratum, to one of translation and rotation. The latter is more and more marked, the nearer they are to the stratum of serum. The globules that happen to be dashed into it become motionless; those which merely touch it undergo a movement of rotation, as if they had jostled against an undulating surface. This stratum protects the vessels by means of its immobility, as it prevents the friction of the globules against their walls. It is only where it is in contact with the periphery of the vessel that it is perfectly at rest; the globules move with a progressively increasing velocity in proportion as they are close to the axis of the vessel. This difference of velocity and movement in the globules placed in the center, or near the periphery of the vessel, does not exist in its lateral direction only. Those occupying its inferior part are slower in their progress than those situate at its upper end, as may be easily ascertained by examining comparatively those two parts.

“The irregularities occurring in the movements of the globules, are, therefore, to be ascribed to their relative position to the adhering layer. Thus let us suppose two globules advancing together with equal rapidity; one of them, jostled by its companion, is driven toward the periphery, its movement slackens, and it remains behind; the other continues on its way. Another jolt, from some other globule, restores the one remaining behind, to its former place, in the center, and the moment this occurs it is borne away by the current and regains its previous velocity. In other cases a globule gets placed cross-wise, so that both its extremities are immersed in the motionless stratum; its movement is thus slackened; others overtake it, press upon, and accumulate behind it; the passage is intercepted, and a sort of dyke opposes the further advance of the globules. Shortly after the globule which has caused all this disorder moves from its abnormal position, becomes longitudinal, resumes its motion, and at the same instant, all the others reacquire theirs. These agglomerations of globules very rarely occur in cases where the heart retains its full force, and the animal continues strong; they are consequently, in general, observed only toward the close of an experiment. The existence of a motionless stratum, being a continual present and powerful cause of slackened movement in the globules, it is indispensably necessary for the force that moves the blood to have a certain degree of power in order to carry on the capillary circulation.

By means of anastomotic communication all these minute canals are made vicarious of each other. When a mechanical obstacle is created in any point, the globules stagnate; the resistance is out of proportion with the motor power, and the liquid remains at rest in its tubes. The central globules are not in the least influenced by the motionless peripheric stratum in the large vessels, in consequence of the distance separating them from it. In the capillary vessels, on the contrary, they are obliged to traverse a mass of serum, of which the central filament alone, if I may so speak, possesses any rapidity of motion. Haller, Spalanzani, and other physiologists, saw the globules advance, retreat and move in a variety of directions; but these are not, as has been maintained, vital phenomena. The arrangement of the globules among each other, their relation to the motionless stratum of serosity, and other circumstances, give us the key to the comprehension of all those peculiarities." * * * *

"In investigating the capillary circulation in animals, the microscope is always employed, and the animals on which such examinations may be most effectually made, are frogs and salamanders, among batrachians; mice and small rats, among mammalia. The tail of some fishes too, is, from the transparence of the integuments, well adapted for inspections of this kind. I shall extract the greater part of the facts I am about to lay before you from M. Poiseuille's 'Essay on the Capillary Circulation.' As this essay has not yet been printed, I shall quote some passages *verbatim*, commencing with the simplest phenomena.

"The experimentalist separates the femoral artery and vein from their connections with the surrounding tissues by delicate dissection, and then passes a ligature round the thigh, taking care to tighten it forcibly; the circulation of the part is now carried on solely by the two vessels named. The animal is pinned down to a plate of cork, so as to make the inter-digital spaces correspond to the object-glass of the microscope. When he has ascertained the degree of velocity of the globules, he intercepts the course of the blood in the artery, leaving the vein free. The globules still continue to move, but do so more slowly, and their movement gradually grows slower and slower, until at the end of two or three minutes, it ceases completely. When the compression is taken off, each globule which was in a complete state of rest, instantly starts off with the rapidity of an arrow, and recovers its normal velocity. Some physiologists on observing the persistence of the movement

of the globules after the impulsion of the heart had been prevented from acting on them, were very naturally perhaps induced to recognize a sort of inherent progressive force in those bodies, which, they further supposed, directed them from the arteries toward the veins. Others conceived that the latter vessels exercised a kind of aspiration on the globules; both these notions are erroneous. The same phenomena to which I have already drawn your attention, as existing in the vascular trunks, occurs in the capillary vessels. The facts with which you are already well acquainted, show that the movement of the globules is to be explained by the elastic retraction of the arterial walls below the ligature. When the passage of the blood is intercepted in a large artery the vessel retracts abruptly—the diminution of its diameter takes place suddenly. In the capillary system, on the contrary, retraction is a slower process, and this difference in point of elasticity in the small and large tubes, explains why, in the experiment I have just described, the globules continue to move for several minutes after the application of the ligature.

“The mesentery of a frog is next separated from the animal and spread out on a piece of glass. A certain quantity of blood escapes from the opened vessels, and as those are no longer dilated by the column of blood impelled forward by the heart, they retract, and their retraction is so considerable, that the diameter of some veins and arteries decreases to half its original amount.’

“The flow of blood only ceases when the vessels have reached the utmost limit of elastic retraction; and the greater number do not undergo retraction throughout their entire extent; there are swollen points observed here and there. Now this irregularity in the retraction of the capillary walls depends on the manner in which the small quantity of blood remaining in each tube is distributed, and undergoes coagulation. Masses of globules accumulate in several points, and to each of these accumulations corresponds a swelling of the vessel: for the coats being arrested in their retraction by a physical obstacle, are unable to retract so fully as if the cavity were empty. The notion of the existence of different degrees in the retractile force of the capillaries is, therefore, an incorrect one; remove any clots they may contain from their interior, and the diminution in their caliber will be the same through their entire extent.

“One of the chief proofs adduced in support of the opinion that the globules are endowed with a faculty of spontaneous movement,

is derived from the following experiment. It has been said that if, while you examine the circulation in a capillary vessel, you make a small hole in any point of its walls, the direction of the current within it is instantly modified. The whole column of blood, which a moment before obeyed one and the same impelling power, separates into two distinct columns; these, moving in contrary directions, rush toward the little orifice you have made and effect their escape through it. The action of the heart has ceased to be felt beyond the accidental opening,—the movement of the globules there situated, can not, therefore, be explained by that action; besides, their movement is a retrograde one. What other cause, it is asked, but an act of their will, can cause these intelligent corpuscula to move in this novel direction? The fact, gentlemen, is unquestionably correct, and the inference drawn from it is, no doubt, specious enough; but a little reflection clearly shows it to be faulty. We know that the pressure exercised by the blood in the normal state on the walls of the arteries and veins, is superior to that of the atmosphere. Now this pressure is suddenly diminished at the point of section; to this point, consequently, a rush of blood must, in pursuance of the laws of the equilibrium of bodies, take place. Whatever be the existing direction of their course, it will now become that of the artificial opening; this movement of the globules is also promoted by the elastic retraction of the walls of the vessels, which press circularly on the blood, and, in the absence of the impelling influence of the ventricle, communicate a retrograde motion to it. I see no necessity for imagining hypotheses, when the physical explanation of the phenomenon is so easy and natural. But, further, if you distend a caoutchouc tube with an injection, and then make an opening in its central part, the contained liquid will rush thither from both ends of the tube. The case is the same as with the living vessel. * * *

“Hear another experiment, which proves in the clearest manner that the movement of the blood in the capillary vessels depends on the impulsion of the heart and the elastic retraction of the walls of the vessels. I extract it *verbatim* from M. Poiseuille’s manuscript: ‘The femoral vein, artery and nerve of a frog are accurately separated to the extent of two centimetres, at the least, from the surrounding tissues, and a ligature then passed round the thigh, excluding the vessels and nerve; a loose ligature, ready to be tightened at will, is thrown round the vein. A thread is next fixed to the extremity of each digit of the same limb, to facilitate

the examination of the circulation in the interdigital spaces without modifying it by pricking the tissues. The frog being pinned down to a flat piece of cork, and the web laid under the object-glass of the microscope, the ligature embracing the bone and muscles of the thigh is forcibly tightened. The experimenter is then certain that the circulation in the lower part of the limb is carried on by the dissected vessels alone. The circulation in the arteries, veins and capillaries, goes forward in the same manner as before the performance of the operation described; jerking movements sometimes take place. The globules move more rapidly in the arteries than in the veins; and in the capillaries their velocity is less than in the other two orders of vessels; in some, however, it is greater than others, for reasons to which we need not at present direct our attention. The observer now watches with especial care an artery and vein of the interdigital space submitted to investigation; he then interrupts the course of the blood in the femoral vein; the moment he does so the progression of the globules in the vessels of the digital interspace under examination becomes jerking, and this jerking mode of progression lasts a few seconds only, being followed by an oscillatory movement. The span of these oscillations at first equals the length of five globules, and soon decreases to that of two; the rhythm is identically the same in the artery and capillaries of the interdigital space, and they continue, to the number of forty-six in a minute, so long as the compression of the vein is kept up. While the femoral vein still undergoes compression, the experiment is varied by interrupting the course of the blood in the artery also; the oscillatory motion ceases at the same instant. The globules become quiescent in the artery, the capillaries, and vein of the extremity. If the femoral artery be then freed from constriction, oscillations of equal length, in the three orders of vessels, recommence. These experiments concluded, the heart of the animal is laid bare, and the number of contractions of the ventricles counted; these are found to be one hundred and eighty-six in four minutes, or forty-six in a minute."

LECTURE XVIII.

INFLAMMATION—CONTINUED.

Treatment—Effects of Blood-letting: Magendie's Character and researches, Quotations from him—Blood-letting may cause disease—Bleeding increases Serum—Various Experiments—Excess of Serum embarrasses Capillary Circulation—Promotes Inflammation—Magendie's change of views, Bleeding predisposes to inflammation; Quotation from Hunter; From Tweedie,—Review of his Doctrines; Results of Bloodless practice; Treatment without Blood-letting; Indications—Remove the Cause—Equalize the Circulation—Remove Offensive and Vitiated Matters—Attend to the Skin; Objections Answered; Hæmorrhage; Adjustment of Ligatures.

TREATMENT—EFFECTS OF BLOOD-LETTING.

Having presented you with a general description of inflammation, as developed in its sensible phenomena; and having furnished you with the very best and most reliable information of which our profession is in possession, in regard to the minute changes which occur in the capillary vessels and in the blood, during the inflammatory process; and having produced also in this relation, such experiments as seem best adapted, from the authority of the experimenters, and from the simplicity and conclusiveness of the experiments themselves, to give you a correct idea of the mechanism and movements of the capillary system in a state of health, I believe you are fully prepared to pass with me to an examination of the effects of blood-letting on the constituency of the blood, and on its circulation in the capillary system. As we are now ready to enter into an inquiry as to the most philosophical, and truly scientific mode of treating inflammation, it seems unavoidable that we first dispose of that therapeutic agent upon which so much reliance has been placed for years, by prominent men in the profession. And I hope to be able, before the close of the present lecture, to convince you that, in rejecting the lancet as a means of treating inflammatory disease, we are sustained both by physiological facts and practical experience.

In pursuing our inquiries on this subject, your attention will be directed to the laws which appear to govern the constituent elements of the blood, and its circulation, as influenced by the abstraction of blood; as well as to the special effects of venesection upon parts involved in the inflammatory process. And as I do not desire to deal in mere denunciations, nor yet set up my own *ipse dixit* as authority in this connection, I shall, as heretofore, make free use of such authors as are recognized by the whole profession, and whose interesting researches have been placed upon record, as a general fund upon which all inquirers after truth may draw, to sustain their investigations; and although a vast amount of hypothetical reasoning, and professional abstractions, clothed in imposing verbiage, have almost converted our medical libraries into heaps of rubbish, with only an occasional truth to repay our labors—yet it is our privilege to isolate those facts which constitute the real essence of medical knowledge, and bring them to bear upon the subject before us.

Perhaps no man ever lived that manifested a more disinterested, deliberate, yet earnest desire to arrive at truth in his investigations and experiments, than Magendie; and certainly no man stands more deservedly prominent in the ranks of medical authority, as a bold, successful and accurate experimentalist in physiological and pathological science. Occupying important positions, first, as physician to an important institution in France, and, secondly, as teacher of the principles and science of medicine to a large number of pupils, it behooved him to be exceedingly careful in regard to the principles which governed his practice, and the doctrines he taught: and you will find in all his writings, those disinterested, cool, careful and deliberative characteristics, found in but few authors. You will find him most remarkable in one thing, especially; that is, where he has expressed an opinion which he subsequently perceives to be wrong, he yields at once, acknowledges his error in the most frank and candid manner, and makes the most of the truth by which his former views have been subverted. Unfortunately for the good of humanity, and the advancement of medical science, this virtue has been too deficient in most of the profession.

The extracts which I shall now read, from Magendie in particular, are intended to demonstrate the influence of venesection on the constituent elements of the blood. And first I present you with some extracts going to establish the fact to which I referred

yesterday, that the due proportion of all the elements of the blood is indispensable to free and healthy circulation in the capillaries; and especially, that to the presence of fibrin, the blood owes the property of passing through the capillary system.

Says Magendie, addressing his class :

“ You are already acquainted with a great number of causes that modify the blood and induce disease; but you are scarcely, perhaps, prepared for the announcement, that by means of a therapeutic agent, holding the first rank among the fashionable remedies of the day, I produce the very same alterations in the blood, and, as their result, the very same disorders in the economy. This may, perhaps, strike you as a random assertion; but my words are not lightly spoken. I have within my reach the guaranty of their veracity—experiment shall confirm them. I assert then, loudly, and fear not to affirm it, that blood-letting induces, both in the blood itself and in our tissues, certain modifications and pathological phenomena, which resemble, to a certain extent, those we have seen developed in animals deprived of atmospheric oxygen, of drink, and solid food. You shall have the material proof of the fact. Here are three glasses containing blood drawn from a dog on three different occasions, at intervals of two days. The animal was in good health, and I took care to supply him abundantly with nourishment. In the first glass, you see that the serum and clot are in just proportion to each other; the latter, which is perfectly coagulated, forms about four-fifths of the entire mass. This specimen of blood, consequently, appears to possess the desirable qualities. Now turn your attention to the second glass. The animal was still well fed when its contents were drawn, and yet you perceive an evident increase in the quantity of serum; the clot forms, at the most, only two thirds of the whole. But here, in the product of the third venesection, although the animal's diet remained unchanged, we find a still greater difference. Not only is the proportion of the serum more considerable, but its color is changed. It has acquired a reddish-yellow tinge, owing to the commencing solution of the globular substance. * * * * I will continue to bleed this animal from time to time; but I can tell you beforehand, from the result of similar experiments, that the alteration in the properties of its blood, will entail that of its organs, and finally death. The lung, for example, will become affected with engorgement, cedema, pneumonia, and the entire train of what people are pleased to call inflammatory phenomena; and, mark

the extraordinary fact, that this inflammation will have been produced by the very agent which is daily used to combat it." *Magen-die on the Blood*, page 19.

Please bear in mind that by three successive bleedings, he modified the blood of a dog to such an extent, that the clot was reduced from four-fifths to less than two-thirds the entire mass of the blood; and that the fluid portion was changed to reddish-yellow, "owing to the commencing solution of the globular substance." And you will please remember the assertion of this candid and earnest experimentalist, in view of these results, "that BLOOD-LETTING induces, both in the blood itself, and in our tissues, certain modifications and pathological phenomena, which resemble, to a certain extent, those developed in animals deprived of atmospheric oxygen, of drink, and solid food."

In regard to the elements of the blood, and the necessity of their due proportion to healthy circulation in the capillary vessels, the same author remarks:

"The absence of one of its normal constituents, is not perceptible by any untoward sign; the sample before you appears perfectly identical with the blood that circulates in the living animal. Yet, notwithstanding this apparent similarity, its properties are different; for, if I reintroduce it by a vein, it will at first pass through the large vessels, but on reaching the capillary system, its progress will be arrested; the series of phenomena I have so often described will succeed, and the animal soon perish of the disorders induced by the stoppage of the capillary circulation. Now, nothing has been added to this blood; I have simply removed from it one of its elements—an element, too, that at the utmost, forms no more than from $\frac{1}{1000}$ to $\frac{2}{1000}$ of its volume. That element is *fibrin*, which, while in the vessels is liquid, but when removed from them, becomes solid; and hence, it is to its *fibrin the blood owes the extraordinary property it possesses, of passing through the capillary system.*

"But this is not the only important fact affecting the fibrin; indeed, were we to take this alone into account, we should fall into a very serious error. Let us suppose an animal whose blood contains fibrin, as well as all its other constituent parts, in the normal proportions. If I inject into the veins of such an animal any substance possessing the property of combining chemically, of forming salts with the fibrin, such as fibrinate of soda, potassa, or ammonia, that fibrin will loose its coagulability. The change in the character of the fibrin affects the blood generally; it ceases to

be coagulable, and the usual consequence ensues. You perceive, therefore, that the blood may contain its just proportion of fibrin, and yet be unfit for circulation.

“Observe, I beg you, gentlemen, the fundamental point in the theory of the blood, deducible from the facts just described—it is, that in order to support life it must be coagulable; if it loses that property, existence is threatened, and ceases within a short while; and this is precisely what occurs in the greater number of destructive epidemics. They are specially connected with certain modified conditions of the blood, that cause it to stagnate in the pulmonary vessels. Such was the state of things in the epidemic—the ‘grippe’—by which we were lately visited.”

There are other passages, by the same author, which might have been quoted ~~with~~ propriety under another head, but as this was not done I introduce them here. They throw still additional light upon the topics we have been discussing, while they illuminate the ground we are about to explore.

“There is a fact in physics, remarkable for the excellent term of comparison which it serves to establish between the phenomena of the movement of the blood in our organs and the circulation of liquids in inert tubes. I allude to the enormous pressure which is required in order to make water pass through a tube of very small diameter, while the blood traverses with ease the infinitely more minute tubes that abound in our tissues. There must be some particular conditions to facilitate its passage. What proves their existence is, that if certain alterations are effected in the composition of the blood, it stops, undergoes morbid changes, becomes extravasated and decomposed, and produces the various disorders which pathologists have vainly attempted to explain by the words *inflammation* and *irritation*. What sense, in truth, is there in applying the words inflammation to our organs? Do our tissues really take fire? I confess I know of no example of such a phenomenon. When the blood rushes to a part in abundance, a certain rise of temperature, no doubt, occasionally follows; but it only reaches a few degrees above the normal standard of the organ, and never exceeds that of the blood in the left ventricle. To cause a real inflammation, the elevation of heat should be carried infinitely higher; besides, in many cases also called inflammatory, there is a notable fall of temperature.”

Further on he says:

“But to return. We ascertained that the first condition for the

accomplishment of the circulation, was that the blood should have the property of forming into a mass when removed from its vessels and left to itself. This is the fundamental fact to which the majority of those we shall subsequently become acquainted with will be found referable. Meanwhile we will endeavor to discover the physiological or chemical circumstances, and the particular substances that influence that phenomenon."

He then relates an experiment made by him, by the injection of a drachm of œnanthic ether mixed with an equal quantity of distilled water into the veins of a dog, producing death in three quarters of an hour, evidently from liquefaction of the blood, yet attended with the autopsic appearances of gastro-enteritis; and adds:

"As the sudden introduction of a little œnanthic ether into the veins of an animal destroys the coagulability of its blood, it is by no means impossible but that the prolonged abuse of wine may, in the end, entail similar modifications in the physical properties of that fluid. Much has been written on drunkenness, its effects, and the disorders it induces in the organic functions. The pathological anatomist has examined every organ in its turn, in search of the peccant principle, but in vain; in spite of all that has been done, conjectures are all that we have got. Delirium tremens has been attributed to inflammation of the brain, of the cerebellum, of the meninges; but not a word has been said of the condition of the fluids. It will be my aim to investigate these different points thoroughly; they are of the last importance, for it is by examining the condition of the blood that we have learned the mechanism of the production of several of those terrible diseases that decimate the human species. Thus we have been enabled to explain the black vomiting of the yellow fever that devastates the shores of America." * * * * *

"Continuing our scrutiny into the properties of the blood, we soon discover another of its special characters. This is a peculiar viscousness. Now on first thought, this would seem an obstacle to its passage through the ultimate tubes, but it is in reality an indispensable condition to its free circulation; to such a degree indeed is this true, that viscousness and the normal state of the blood are two inseparable ideas. This property, again, is illustrated by experiments made on inorganic tubes. If we endeavor to introduce water into a tube of extremely small diameter, that liquid, as I have already mentioned, will not enter it, no matter what force

be employed; but if a certain quantity of any mucilaginous substance, such as gum, gelatin, or albumen, be added to it, the attempt at injection becomes successful immediately." * * *

"Now here is the blood of an individual who had an attack of hemoptysis, and was bled freely for it. You know well what I think of that remedy,—*worse, perhaps, than the disease*. Be that as it will, you may perceive that this blood is very slightly viscous; I, in consequence, presume that further mischief will occur. We shall see if my presumptions are realized. We have no instruments to measure the viscosity of fluids; we are, therefore, instead of having an accurate and rigorous estimate of that of the blood, reduced to simple conjectures. I consider that the discovery of any method of measuring it with exactness would be a most valuable acquisition. Meantime we will do what we can to determine it with the areometer. There is further proof that a certain share of viscosity is an essential requisite for the healthy circulation of the blood. If you bleed an animal several times, and replace the blood withdrawn with water, exhalation and effusion into the cavity of the pleura will follow, and subsequently into the peritoneum. Now you have done no more than diminish the viscosity of the blood, by adding a little water to it. But on the other hand, if you try the converse experiment, and augment its viscosity beyond its natural term, the circulation ceases altogether, in consequence of the affinity between the molecules of the blood being rendered too great. The molecules adhere to the walls of the vessels, and impede the circulation, just as blocks of ice, stuck to the banks of canals, or rivers, interrupt the course of their streams. Hence, there must be diseases originating in excessive viscosness of the blood." * * * *

"But there are important facts of another order, totally, to be learned respecting the blood. When we examine that fluid while yet circulating in the living animal, we are immediately struck with its heterogeneous appearance. It is seen to hold myriads of little particles in suspension, rolling on each other, and intermingling in a multitude of ways. These particles, called globules, are known to have determinate dimensions, and to affect particular forms, according to the class of animals in which they are observed. They are elliptical in fishes, reptiles and birds; in mammalia they have the appearance of a circular lens. These globules deserve our close attention; for, when they undergo certain changes, they are unfitted for circulation in their tubes. However, it must be

remarked, that, of all the elements of the blood, they undergo the fewest modifications in disease." * * * * *

"Their mean ordinary diameter varies from the eightieth to the one hundred and twentieth part of a millimeter. There are some considerably smaller, but in all probability they are of a different species from those of which we have been speaking; to ascertain this for certain, however, would be a very interesting as well as novel topic for inquiry.

"If we turn from these purely physiological questions to the chemical history of the blood, we shall find in it many points quite as interesting as those we have rapidly reviewed. The difficulties encountered in the prosecution of that branch of inquiry, are not less serious than those met with in investigating its physical properties. However, it is easy to establish one important fact, namely, that every anormal chemical modification of the blood is followed by morbid phenomena, of just as great cavity as those which have already afforded us subject for discussion." * * * *

"Among other practical points of importance to which these general views have led us, we have ascertained that *venesection modifies the relative proportion of the serum and clot*. Here is the product of the fourth and fifth bleedings which were practiced on the animal I showed you the other day. In the fourth, the serum is to the clot as 55:45; in the fifth, as 65:35. Now this is surely a very great difference; yet in this case the various abstractions of blood took place at intervals of two days, and the animal was fed well all the while, which prevents any very rapid alteration of the blood; and not only is the clot modified, but the serum also becomes whitish, and is pretty often found covered with a layer of opaline matter.

"In fine, the nature of the blood, and of its different elements, is an important question in a therapeutical point of view. We can now maintain, with confidence, *that it is not a matter of indifference whether we bleed little or much*; whether we draw a small or large quantity of blood, in a very short space of time, or at distant intervals; whether we push the abstraction to syncope, as has been advised by many writers, or repeat it to a smaller extent, at several different times, with a variable interval of time between them, as learned practitioners of the present day recommend. We are also justified in proclaiming, that men who bleed without giving themselves the least uneasiness about the disorders that follow the removal of blood, both in that fluid itself, and as their consequence,

in the various organs; who look on these disorders as curable by blood-letting, while they are, in reality, produced by it, act with most reprehensible blindness. In simple language, they do mischief where they imagine they are doing good; and in many an instance, on their doing that mischief or that good, the death or recovery of their patient depends."

Having introduced the foregoing quotations from Magendie, for the purpose of establishing in your minds clear ideas of the properties of the blood indispensable to its free circulation in the capillaries, the quotations which follow will tend mainly to exhibit the tendency of venesection to change the character and destroy the equilibrium of the blood, so as to render it unfit for capillary circulation. In fact, the quotations already made do not leave this point doubtful, but as more direct testimony is at hand, I will introduce a portion of it, before stating my own views in regard to the proper treatment of inflammation.

Speaking of the results of bleeding an animal which he exhibited to his class, Magendie says: "His blood contains as much serum as clot. Here is the product of the seventh venesection practiced on the animal, about which I have already more than once spoken. Although he eats and drinks as much as he likes, his health is materially affected, a notable change has taken place in his gait, habitudes and temper. *The mucous membranes have grown singularly pale*—a peculiarity which has been long noted by veterinary practitioners in appreciating morbid symptoms. When he is bled now, syncope follows. I have no doubt but that an affection of the lungs will soon come on, and speedily put an end to his existence."

Again, the same author, in a subsequent lecture, says: "I stated to you that repeated blood-letting caused a variation in the proportions of serum and clot; but I have ascertained a still more important fact. It is this: in every case of serious disease I have met with since commencing the researches with which we are at present engaged, those two elements have invariably presented some anomaly, in respect of their relative volume." He then introduces cases in illustration and confirmation of this point, and adds:

"A medical practitioner gave me some of the blood, drawn on three successive occasions from a patient affected with pneumonia. Each of the bleedings was abundant. The two first were practiced

on the day of the patient's admission; the last on the fourth day of his sojourn at the hospital.

"In the first there are 11 grammes of serosity and 50 of clot, which gives about 22 parts of serosity in 100. In the second, there are 24 grammes of serum to the same proportion of coagulum; the relative quantity of serosity was, therefore, more than doubled. Finally, the third gives 34 of serum to 35 of clot; that is, 50 *per cent.* of the former. These augmentations of serum, induced by bleeding, ought surely to have struck practitioners. I have full room for astonishment at their having excited so little attention, for it is a regular practice to have the blood of patients set aside for examination. At the end of twenty-four hours, usually, this examination is made. The clot is felt, turned up and down, and fingered in every direction; and all with a view to the discovery of an appearance of *buff*. If this *buff* can not be found, the conclusion is, that the disease is not inflammatory, a conclusion well worthy of the process by which it is obtained. But if you intimate to the physician that the serum has, at the second bleeding, acquired double its previous proportional quantity, and that it has lost its normal transparence, and that the clot is soft and diffuent, he will answer, that such things are not of the most trifling consequence. No, the really important point is, to detect the inflammatory element, were it only the veriest morsel of it, and then to annihilate it by the antiphlogistic treatment. Such is the manner in which medicine is generally practiced. When we consider, gentlemen, that in spite of the plainest and most forcible facts, the majority of medical men persist in blindly following a regular routine that brings discredit on the art, we are surely justified in applying to them these words, which, in more than one view, recapitulate the history of men,—*they have eyes, that they may not see.*"

"A superabundance of serum in the blood is, in my mind, a positive contra-indication to blood-letting; and I conceive that this fact will sooner or later be admitted as a fundamental position in the treatment of disease. It is fully established, that inopportune bleeding may singularly aggravate the condition of a patient, and even render his restoration to health a positive impossibility."

And yet a superabundance of serum is by no means inconsistent with the existence of the most aggravated forms of inflammation—may indeed be the cause of such inflammation. How then shall inflammation be arrested by the lancet, which uniformly increases

the serosity of the blood? In a single instance Magendie found himself mistaken in anticipating the effect of depletion. He attempted to ascertain what proportion of serum to the clot is essential to vitality. To hasten the experiment, he drew blood from an animal, and replaced it by injecting into the vein an equal quantity of distilled water at the temperature of the blood. The result was a diminution of serum. Speaking of this circumstance, after remarking that one well observed fact can not overturn another, he says:

“Under circumstances like these, we should confine ourselves to registering the seemingly contradictory facts, and waiting patiently until further observation enabled us to get rid of the difficulty. This is what we will now do; we will note down, that *repeated venesection increased the quantity of serum in a patient*, while the same agency appears to have had the contrary effect on this dog. However, it is right to mention, that the circumstances are not precisely the same in both cases. In the instance of the animal, there is, in the first place, a certain amount of forces in the organism, which tend to keep the blood within certain limits of composition. There is also a direct and most efficient cause why the introduction of water into the veins should not contribute to increase the quantity of serum in the blood; it is that, as my assistant this moment informs me, the animal has an abundant miction after each injection.

“You are aware, gentlemen, with what rapidity fluids, ingested into the stomach, are carried by the veins of that organ into the general circulation, and thence to the kidneys, which they stimulate to secretion. Thus, when we drink beer, seltzer water, or champagne, we are almost immediately seized with a desire to void our urine. There can be no doubt, that, if we could retain these liquids longer in the circulation, a bleeding practiced before this expulsion, would discover evidence of their presence in the blood; but as they give an extraordinary degree of activity to the urinary secretion, they are quickly removed from the body. To continue our parallel: when a patient is bled, he is put on a very low diet; the animal on which our experiment was made, has, on the contrary, been given abundance of nutritious food, and, therefore, provided with the means of repairing the losses of his blood. A patient treated on the antiphlogistic plan, is placed in a diametrically opposite condition; his blood is taken from him, and he is, at the same time, deprived of all nourishment; he has nothing

wherewith to make up for the lost blood but ptisans, of which, to speak a truth, he is allowed no niggard supply. But as the restoration of the mass of the blood is indispensable, the lost elements must be got, as best they can, from these same ptisans; hence, without doubt, comes the increase of serosity. Still it would be an interesting point, to learn the means and mechanism by which an animal is, in a case like the present, enabled to maintain the component parts of his blood in their normal proportions.

"In spite of any thing that may seem to indicate the contrary, it is perfectly true that any signal disproportion between the serum and clot, renders the blood unfit for the performance of its functions. A very curious case, supporting this doctrine, has been recently observed in my wards in the Hotel Dieu. A female was, some time past, admitted under my care, with most violent uterine hemorrhage, which had existed for two days at the time of her admission. This was the consequence of an artificial miscarriage, induced by the use of those powerful drugs which certain women, whose moral turpitude is even greater than that of the unfortunate beings employing them, make a trade of vending. As I have since learned, it was not her first attempt in this way; she had already succeeded twice or thrice in producing abortion. Such practices would be less frequently had recourse to, if their terrible consequences were better known. I may here say, that death is often the most desirable issue in such cases, for it puts an end to most atrocious suffering. In other instances, incurable mental alienation, or abdominal neuralgia, that no remedy can soothe, follows. Various cases of this kind, have lately come before me, and I distinctly ascertained that serious disorders of the brain were the occasional consequences of these criminal practices.

"In the example to which I more particularly advert, there was, as I said, hemorrhage from the uterus. The general pallor of the subject was very remarkable, as well as the state of prostration and stupor under which she labored. Her blood trickled away in diffuent clots of a peculiar odor; it was this indeed which turned my thoughts to the probability of a premature delivery having taken place; this, however, the patient employed all her remaining strength in pertinaciously denying. I had two ounces of blood taken from her; not on homeopathic principles, but to enable me to prognosticate the probable issue of the affection. Here is the blood, the disproportion of its elements is frightful; there is only 15 per cent. of coagulum. I affirm, that with such a

quantity of serum in the blood, the capillary circulation can not be regularly accomplished." * * * * "At the end of forty-eight hours, during which every drug supposed to possess anti-hemorrhagic virtues was employed, among the rest *secale cornutum*, *peritonitis supervened*. You know that by this term is understood a disordered state of the secretion and exhalation of the serous membrane of the abdominal cavity. You find, after death, a viscous liquid, in the midst of which flocculi of albumen are seen to float, etc."

"Now, can you fancy that the attack of peritonitis was the result of excitation, or irritation, suffered by the patient? She was, on the contrary, perfectly anemic, and in the most marked state of weakness, and peritonitis is so acute a disease, that it carried her off in less than four and twenty hours. Is no relation to be recognized between the liquidity and slight coagulability of the blood and the affection of the peritoneum? But this is not all; if we turn from the abdomen to the lung, there, too, we find a state of engorgement, in other words, serosity effused; in short, lesions perfectly analogous to those detected in the lung of the animal submitted to repeated blood-letting. I may, therefore, legitimately conjecture, that these diseases are to be referred to particular conditions of the blood. In peritonitis I find an effusion of serosity, and I know that there is serosity in the blood also. I also discover a substance solidified in the form of very thin lamellæ; may I not suppose that this is the fibrin of the blood escaped from its vessels and become organized?"

In a subsequent lecture, Magendie further discourses on this subject as follows:

"The point in the history of the blood about which we are at present more immediately interested, is the effects induced in the economy by variations in the relative quantity of the serum. If we could succeed in determining, even in an approximate manner, the influence of those changes on disease, and on temperament, we might assuredly lay claim to the honor of having done some service to pathology. But, gentlemen, this question is not one of those that may be solved in a single lecture, nor in two, nor in three; it requires to be examined in various points of view, and calls for the evidence of facts of an accuracy that none can gainsay. When we shall have studied this branch of our subject, we will turn to the chemical composition of the serum and clot, which, it can not be denied, still requires minute investigation,

although it has already been laboriously studied. We have hitherto done no more than receive specimens of blood into vases, examine them and the changes they undergo therein, compare as well as we could the proportions of their liquid and solid constituents, and inquire if the phenomena of life can continue to be accomplished with such and such quantities of serum and clot. You have already seen, by the serious modifications induced in the state of the economy by certain diversities in their proportions, that we are not without plausible motives for investing this question with the importance we have done. Let me recall to your minds the case of uterine hemorrhage of which I spoke to you in my last lecture, following abortion produced by criminal practices. You can not have forgotten the consecutive symptoms, such as the intense peritonitis which supervened at the end of two days, accompanied with most violent pains and embarrassment of the respiratory system, and which terminated by death in less than twenty-four hours. This case is worthy of close consideration; for, setting aside the signs proper to that fatal affection, we may ask, what is peritonitis? what are its mode of origin and first cause? In general, the answer is, that it is an inflammation of the peritoneum: that the mode of vitality of that membrane is changed by irritation; that this irritation accumulates the blood in the capillary vessels, which were previously impermeable by it, and that both an increase and a modification of the materials of exhalation are consequently produced. When these different suppositions, and a variety of others, have been more or less carefully enumerated, it is presumed that all has been said; nevertheless, the real question has not been so much as glanced at. For my own part, though I admire the ingenuity of those pathologists who have made peritonitis one of the inflammations *per eminentiam*, I can not quite accede to the correctness of their opinion. We found in the blood of the woman to whose case I now especially refer, a most remarkable proportion between the serum and clot; there were 85 parts of serosity to 15 of coagulum. This single fact was in itself enough to suggest to our minds a very different explanation of the disorders under which she succumbed, from that afforded by the doctrine of inflammation; and we had no difficulty in establishing the existence of certain relations between this occurrence and the phenomena daily observed in our experiments. Among other things, you saw that there was a most striking resemblance between the lesions of the lungs in our patient, and

those occurring in the pulmonary organs of the animal submitted to a series of successive bleedings. But I must avail myself of the present opportunity to point you out a physical phenomenon long mistaken by medical men for a pathological change. In consequence of the greater or less liquidity and diminished consistence of the blood in certain cases, it becomes infiltrated from the capillary vessels in the pulmonary cells, accumulates therein, and constitutes the effusions known under the name of *hypostatic pneumonia*, which is in truth a simple effect of gravitation."

From what has now been quoted no room is left for doubt, that fibrin is an element, the presence of which facilitates the capillary circulation, and that its appearance in inflammatory affections is merely evidence that the system is employing the proper means to overcome obstruction and repair injury. It is equally well established by the quotations read, that an undue amount of water in the blood is inconsistent with free circulation, and tends to produce or at least aggravate inflammatory action. The authorities quoted also show, what all the profession admit, that the loss of blood rapidly diminishes the red corpuscles and is followed by an increase of serum. Indeed, under the idea that fibrin is the inflammatory element, the practice of blood-letting finds almost its only justification. [Blood-letting does not diminish the absolute quantity of fibrin, but it diminishes the corpuscular element, causes absorption of water and thus augments the serum. S.] But the readings to which you have just listened establish still another fact, which too, can not be questioned by any advocate of the lancet, and that is, that the use of that instrument tends directly to increase the serum at the expense of the clot; or in other words, to produce such a disproportion between these two elements as to most surely embarrass the circulation; and when carried to a certain extent, to render the blood incapable of forming a consistent coagulum.

From all the evidence before us our only decision must be, that blood-letting is not only incapable of arresting inflammation, but that it tends to promote it by embarrassing the circulation. As a still further confirmation of this opinion, and as bearing especially on the practice, which has been extensively prevalent in the profession, of providing against apprehended inflammation, in cases of injury, or where capital operations are necessary, I shall read one more passage from Magendie. He says:

"These reflections on the serum remind me that when I commenced my medical career, imbued with the prejudices of the

schools, and just such a novice as men usually are when they give up attending lectures; when, too, like my brethren, I paid my tribute to scholastic dogmatism; that is, I believed in inflammation, irritation, and the rest of it, as in so many articles of faith; they remind me, I say, that even at that early period, these questions excited my attention. You shall hear how I was led to their consideration. It was, at the time I allude to, an acknowledged point of doctrine that the abundance of serosity acted on the blood by *modifying its tendency to inflammation*, in somewhat the same manner as water added to alcohol prevents it from *inflaming*. Here, gentlemen, the word is used in its true signification. I had, as it happened, set about repeating the experiments of Sir Benjamin Brodie, now one of the first surgeons in England, on the ligature of the ductus choledochus. The animals on whom I practiced the operation, died without exception, of peritonitis. With a view of preventing this disagreeable result, I practiced a copious bleeding before the experiment, fancying, in conformity with the notions then prevalent, that I should thereby infallibly put a stop to the development of inflammation,—the inflammation nevertheless appeared with even still greater intensity than before. Subsequently I injected water in the room of the blood withdrawn, but in every instance peritonitis supervened with greater violence than before, and proved rapidly fatal. At the present time when more correct notions on pathology have replaced those of former days, it appears to me that the more the blood abounds in serosity, the more probable it becomes that the consecutive exhalations of the serous membranes will be abundant; and hence, that, to use the orthodox language, inflammation will be more violently developed. Now, this fact alone shows what fatal consequences may be the result of a fallacious theory founded on an imperfect conception of the morbid phenomena occurring in the body. I do not hesitate to assert that the anti-inflammatory bleeding ordinarily practiced before capital operations, may frequently, according to the constitution of the individual undergoing them, help to determine the serious accidents observed to follow those operations. I recommend you strongly to take a note of this proposition, and to watch with attention the issue of cases in which such prophylaxis has been adopted. You will, no doubt, find exceptional cases, but in the majority I make no question you will have reason to admit the justness of this view. The whole forms a subject for inquiry, which, though of great interest, has not yet been examined by any

one. I myself long upheld contrary opinions to those I now maintain, but I willingly sacrifice my vanity and acknowledge my error; if all were as ready to do so, the progress of our science would be much more rapid."

What experiment and sound reason so clearly indicate to be truth, gentlemen, we shall generally find confirmed in practice; and such I know to be the case in respect to the proposition now under consideration. Let a healthy person receive an injury sufficient to justify the apprehension of inflammatory action; and let the lancet abstract blood from his system to any considerable amount. If inflammation was to be apprehended before, it has now become unavoidable; and instead of the reparative, I might say healthy character of the excitement which would have ensued, you will now have an intensity of morbid action, in exact proportion to the changes you have effected in the blood by your venesection. And indeed, it may be laid down as an established rule, that inflammatory action is least to be deprecated, and is always most manageable, when the constitution is most strong, and the blood in a normal condition.

But for the correctness of this doctrine we need not depend on the authority of Magendie alone, however unimpeachable. The same view is in fact sustained by Hunter, Tweedie and others.

"In inflammation," says Hunter, "when the constitution is strong, then it will be commonly the most manageable, for strength lessens irritability. But in every kind of constitution inflammation will be the most manageable where the power and the action are pretty well proportioned."

Again: "A wound, for instance, made upon a person of a healthy constitution and sound parts, will unite almost at once; it admits readily of a union by the first intention. A greater strength of constitution and of parts admits of resolution, while in the adhesive state of inflammation, very readily, and therefore tends to prevent the suppurative inflammation from taking place, for it gives a better disposition to heal by the adhesive; so that the union of parts by the first intention, the inflammation and resolution, as well as the readiness to change from one to the other, according as the preceding is prevented, depends equally upon the strength and health of the constitution and parts inflamed. We may also observe that a greater strength and soundness of the constitution or parts inflamed, when the inflammation has got beyond the stage of resolution, and has assumed

the disposition for suppuration, hastens on inflammation and supuration, and also brings it soon to a termination, while at the same time the matter is brought more quickly to the skin by ulceration. Whatever therefore, is the step which nature is to take, whenever an injury is done or a necessity for inflammation has taken place, it is performed with readiness and facility in strong constitutions and parts.

"Weakness of constitution and weakness of parts are supposed to be the immediate causes of most tedious or chronic diseases." In regard to this last proposition Mr. Hunter says: "Where there is a strong susceptibility for any one disease, in which weakness might also become a predisposing cause, I can believe that in such cases weakness, especially if suddenly brought on, may become an immediate cause of that disease: as for instance, a man may, from a wound or any other cause, have a tendency to a locked jaw. If you bleed that man freely it is a thousand to one that a locked jaw comes on; weakness produces a consciousness of its own want of powers, or incapacity, which produces increased action, that even proceeds the length of unnatural actions called nervous." * * * * *

"When a wound is made in a person of a weak habit there is a great backwardness in the two cut surfaces to unite by the first intention, therefore inflammation takes place if there be strength of constitution to produce it, which is not always the case, so that in such habits inflammation is more likely to be a consequence; but this does not arise from a greater readiness to inflammation in the habit, but from a want of power and disposition to heal, which renders inflammation necessary. However, in this case, the want of powers or disposition to unite may partly depend on a different principle from that of weak parts or solids: it is probable that the blood of people of weak habits, is weak in its living principle, which it therefore very soon loses upon extravasation, so as to become unfit for a bond of union, by which it degenerates into an extraneous body, and therefore the suppurative inflammation must take place if there be strength to produce it.


"In weak habits and diseased parts inflammation is slow in any of its salutary effects, and is hardly capable of either producing the adhesive or suppurative inflammation."

This same doctrine of the necessity of vigor in the constitution, to sustain necessary inflammatory action, is clearly taught also by Tweedie, in his voluminous Library of Practical Medicine; and he

also fully recognizes the tendency of blood-letting to deteriorate the blood, and enfeeble the constitution, and acknowledges its injurious influence on the termination of inflammation in many cases; yet he is one of the most strenuous advocates of its general employment in inflammatory affections. It is strange, passing strange, that with all the acknowledged facts before his eyes; with the revelation by the microscope of the uniform condition of the parts involved in inflammatory action; and the well-known influence of general bleeding upon the constitution of the blood, and upon its circulation in the capillaries; and with a personal experience and observation which compel him to acknowledge that "it is in a few cases only that blood-letting can be said to cut short inflammation;" and that "the more usual effect to be hoped for, is more correctly expressed by saying, that it *disposes it to a more favorable termination*;" it is I say, passing strange, with such facts staring him in the face, this author has never conceived or at least expressed the suspicion that this unnatural and hazardous agency should be entirely dispensed with, and such means employed for the treatment of inflammation as will more generally tend to cut it short.

I will give you one or two remarks of this author, which, although they may look strange in the new relation which I compel them to assume, yet they will I think serve a much more valuable purpose in an argument against the sanguinary mode of treatment than they can ever do on the other side of the question.

"In judging of the effects of blood-letting on inflammation," says Tweedie, "it is important to observe, that the remedy may be highly beneficial, even in cases where the inflammation may extend, or the *effusions consequent on it increase, after its use*. It may often be observed, as in cases of pneumonia, that after full bleeding, the fever subsides, and the breathing is considerably relieved; but, nevertheless, the indications by auscultation and percussion, of the extension of the effusion in the lungs and pleura continue for some days. But if the febrile *symptoms do not return*, and the *breathing continues easy*, it may nevertheless be confidently predicted that, *under proper management*, in a sound constitution the case will terminate favorably, and the effusions gradually disappear by absorption and by expectoration." * * * "It is in few cases only that blood-letting can be said to *cut short* inflammation; the more usual effect to be hoped for, is more correctly expressed by saying, that it *disposes it to a favorable termination*."



"While such benefits are to be derived from the prudent use of blood-letting in the strictly inflammatory diseases, and in their early stage, it is equally certain that in diseases not strictly of that type, and in the advanced stages even of the best marked inflammations, it may either *aggravate and prolong the disease, or even rapidly and considerably determine its fatal event.*"

Now, with so little hope of "cutting short" the inflammation, with the bare possibility that fever *may* not return after bleeding, and that the case may terminate favorably under "proper management;" and in view of the nice distinctions as to constitutional condition, stage of the attack, type of the disease, etc., thus shown to be indispensable to its safe exhibition, how in reason can a sane man contend for the practice of general blood-letting? But perhaps the cases in which its use is advisable are so clearly defined that there is no danger of mistake, and the few cases in which the measure is admissible may be readily determined. Let us see what our author says on this point:

"The symptoms by which such distinctions are to be established belong, of course, to individual diseases, and can not be advantageously stated here; but there are two symptoms common to all inflammatory complaints, and often guiding in a degree the use of blood-letting,"—"these are the state of the pulse, and the state of the blood in inflammatory diseases." He then gives the peculiarities of pulse,—such as the *more frequent*, the *fuller*, the *firmer*, or *stronger*, and the *sharper* pulse, compared with the natural pulse, as indicating the inflammatory condition. "But," he says, "There are many cases of active inflammation, admitting of the most essential benefit from blood-letting, in which one or more of the peculiarities here stated are absent." And again:

"Of the possibility of this fallacious fullness and even sharpness of the pulse"—"some of the experiments of Dr. Parry on animals, killed by repeated bleedings, and in which the pulse was '*full and bounding*' almost to the moment of death, afford unequivocal proof. And it were easy to quote practical observations by Rush, Armstrong, Marshall Hall, Travers, and others, illustrating this '*reaction after the loss of blood*,' which may, perhaps, be most correctly described as a modification of the inflammatory fever, produced in a great measure by the loss of blood, and persisting after the local inflammation has subsided or passed into a state no longer demanding evacuation."

The pulse, then, is no safe guide; for, according to this most

orthodox theory, we should often bleed when the pulse forbids; that is, when "one or more of the peculiarities" denoting inflammation "are absent;" and it may be "fallacious," and seem to indicate the lancet, when the "inflammation has subsided or passed into a state no longer demanding evacuation."

But the blood,—we may surely rely upon *its* appearance and state to guide us in "the use of blood-letting." Let us see: First, you must abstract, and let it stand and coagulate, before you can ascertain whether its abstraction is proper or not. You must also be very expeditious in your experiments and examinations of the clot, serum, buffy coat, etc.; the time consumed may carry you beyond that "early stage" in which the measure will be proper. Well, having satisfied yourself as to the state of the blood, are you now prepared to act? Suppose you find the buffy coat, will you proceed to take more blood? Be cautious; for, says Dr. Tweedie, "In regard to the buffy coat there are occasional anomalies not yet understood." And again: "If, however, as is most probable, the blood acquires this property by passing through the vessels of the inflamed part, it is easy to understand that, for some time after even intense inflammation has set in, the *buffy coat will be slight*, or even imperceptible; and again, that when inflammation of some standing is declining, or still more, when it has passed into the stage of suppuration or ulceration, the buffy coat will still be found in perfection: and, therefore, that its absence or slight degree in the early stage of inflammation is no reasonable objection to blood-letting; and that its presence in the advanced stage (especially if suppuration is going on) is no indication for the remedy."

Thus, then, our second guide in the use of blood-letting utterly fails of affording any reliable assistance, and we are left to the uncertainty of chance in the exhibition of an agent, which if we would be orthodox, must be employed in a case of active inflammation. The pulse is indefinite; the blood may be without the buffy coat; if we wait long the first stage may be past, and we can not bleed at all: if we only knew the case required bleeding, or would "*bear*" it, and that this is the proper time, we might possibly "*cut short*" the inflammation, or at least "*dispose it to a favorable termination*;" but then to take blood wrongfully may do much harm; there may be "reaction after the loss of blood;" or one of the chief evils which Dr. Tweedie says, further on, "is always to be apprehended" from large and repeated bleeding, may arise,—namely, "that it always increases the facility with which the

surface of the body may be chilled, and, therefore, the liability to relapse, or to the excitement of fresh inflammatory disease, perhaps of worse character, on any subsequent exposure to cold;" or we may "aggravate and prolong the disease, or even rapidly and considerably determine its fatal event." What say philosophy and true science, under such circumstances, should be our course? Most emphatically, "bleed not at all," is the response heard by every unprejudiced mind.

Thus gentlemen, I have given you a summary of the experiments which have been made with the blood, for the purpose of determining its normal composition, the influence that any deviation from the due proportion of its elements has upon its circulation in the minute tubes of the capillary system which have to be traversed by it, and the effects of blood-letting on its constituency and on its capillary circulation. I have as I think, fairly examined, by the light of science, the claims of the blood-letting theory; and now, in view of all that has been said, and in view of one other fact: that thousands are dying annually of inflammation, under orthodox practice; I ask in all candor whether we have not sufficient reason for rejecting *the blood-letting treatment*, and seeking a better mode of practice? That better mode it will be my pleasure now to describe.

Truth is what we all desire, and after men have theorized, and speculated, and dogmatized, to the full extent of their mental and physical powers, we are not satisfied with their conclusions, unless they bear the impress of her signet, and that indorsement is only to be obtained in the department of practical experiment. But when the results of our practice verify the correctness of the conclusions we have drawn from natural phenomena, as observed in health and in disease, we feel that we are standing on tenable ground; and when I assert, as I do, without fear of contradiction, that within the last fifteen years, I have treated nearly every form of inflammatory disease, without resorting to general blood-letting in a single case, and with uniform success,—I merely state the simple truth. And such being my experience, it is vain for any one to tell me that this class of disease can not be successfully treated without the lancet. In my early practice I frequently resorted to blood-letting, though not as frequently as most other practitioners of that time,—and now, when I compare the results of my practice in these latter years with those which attended my early experience, it is with the most triumphant satisfaction that I

declare to you, that the anti-blood-letting treatment, which I am about to describe, has not only been attended by little fatality, but that it has proved more promptly curative, and has been very rarely followed by any of those consequences of effusion which so frequently follow the treatment of inflammation by general blood-letting.

But my hour has expired, and I must defer what I have further to say on this subject, until our next meeting.

LECTURE XIX.

INFLAMMATION—CONTINUED.

Treatment without Bleeding—Indications—Remove Cause—Equalize Circulation; Attention to Skin; Objection Answered; Hæmostasis—Adjustment of Ligatures; Other Measures.

TREATMENT—WITHOUT BLOOD-LETTING.

Having occupied so much time yesterday with the subject of blood-letting, I was unable to give you any information in reference to the general mode of *treatment* which the Eclectic school of medicine regards as appropriate in inflammation. This I propose to do in the present lecture.

From what was shown to be the condition of the parts involved in inflammatory action, and the effects of general blood-letting on the circulating fluid, you would not now need to be told, even though you had never heard it stated, that we reject the lancet as a means of treating inflammation. And yet so universal has been the resort to this mode of treatment, that when we speak of any other method, it seems almost necessary to regard it as a substitute for venesection. Should not the very opposite of this be regarded as the true state of the case—namely, that general blood-letting has been substituted for the rational and philosophical management of inflammation, and that our object and duty are not to find a substitute for bleeding, but, having demonstrated its inappropriateness, to lay it aside, and adhere to measures truly scientific and curative?

The *first indication* to be fulfilled in the treatment of inflammation, is, if practicable, to remove the cause of the difficulty. It will be of little avail to give medicines, or employ means to arrest, modify or palliate inflammatory action, while the irritating cause, whether local or constitutional, remains. So that the very first subject of inquiry, when a case of inflammation is brought under your notice should be, what is the cause of the morbid condition?

This principle should not be lost sight of in any case, for without reference to it, you must in a measure operate in the dark. Having no plainly defined indication to fulfill, you are compelled, where the cause is unknown and can not be ascertained, to act upon supposition or assumption which may or may not be correct; but when you know the origin of the difficulty, you will feel far less embarrassment in determining what treatment is required.

Of course I can only speak now in general terms of the principles to be observed. Special means and instrumentalities must for the most part be deferred until I take up the special diseases. Having ascertained the cause, your remedies must be adapted to the peculiarities of the case. It is true, the present difficulty may be no longer dependent on the cause that originated it, as the inflammation produced by a scald; but if so, you should certainly know that fact. There are many cases however, where the inflammation is not only originated, but sustained and increased by the constant operation of the exciting cause, as where gastritis has been produced by alcoholic liquors, and the individual still keeps up the habit of dram drinking. Sometimes the inflammatory action is merely the reflection of some prior disease, general or local, and it may progress until the reflection will become the paramount difficulty, obscuring, perhaps entirely eclipsing the primary affection; though that may still remain and exert its injurious influence on the case, rendering futile all efforts to remove the inflammatory disease. This fact should by all means be detected wherever it exists, and the proper treatment instituted for the removal of the primary cause. When this is accomplished, you are prepared to manage the inflammatory affection with more prospect of success. You then have to contend with the secondary affection alone, whereas before, you had the original difficulty also on your hands.

Having removed the cause or ascertained its absence, the next most important indication is that of *equalizing the circulation*. When this shall have been accomplished, and an equilibrium of the circulating fluid is established throughout all the minute ramifications of the capillary blood-vessels, you will of course have obviated the difficulty and accomplished your work. But you must be careful to attend this end by such means as shall not inflict violence on the constitution, or impair the vital functions; hence general blood-letting is out of the question.

The indication next in importance, and one indeed to which

your attention should be directed simultaneously with the fulfillment of the last, is the *removal of offensive and vitiated matters* from the system. The measures employed to effect this object will also be among the most effectual to equalize the circulation. Hence I say the two indications should receive simultaneous attention. A thorough evacuation of the stomach and bowels is, generally, the most appropriate measure which can be directed for these purposes. It accomplishes a three-fold object: first, the removal of accumulations, whether of undigested food, vitiated secretions or fecal matter, from the alimentary canal, which if allowed to remain must be a source of disturbance to the entire system; secondly, the stimulation of the secretory organs to increased action; and thirdly, the equalization to a greater or less degree, of the general circulation. In addition to these manifest and immediate results of gastro-intestinal evacuation, it is a fact that you will remove from the circulating fluid of the body, by the operation of one thorough cathartic, a greater amount of matter than you would dare to abstract by venesection, and that too, the very matter which it is best to have withdrawn; and the loss of which will not destroy the equilibrium of the normal constituents of the blood. You draw off through the eliminating functions of the intestinal surfaces and glands, the effete, irritating matters which are embarrassing the vital functions, and you leave behind the healthful elements of the blood, so essential to life, and to the repair and replenishment of the different organs; and you do it without injury to any of those organs. Besides it has already been shown beyond all question, that the loss of blood does not tend to produce permanent reduction of inflammatory action.

The vacuum, so to speak, produced by the sudden abstraction of blood, is filled at the expense of the capillary circulation, and thus a temporary mitigation of the inflammatory engorgement is effected; but this is immediately followed by a returning tide, impoverished by venesection, and unfitted, as Magendie has demonstrated, for free capillary circulation. Hence blood-letting so far from curing, must necessarily aggravate the inflammatory condition. No such result will follow the operation of an appropriate cathartic.

There is another indication analogous to the preceding, and scarcely less important; and that is, to promote a *healthy condition and increased action*, of the *skin*. The last mentioned measures had in view of the removal of obstructions from the internal surface,

and the establishment of laudable secretions from the mucous membranes and glands; but the external surface is greater in extent, equally liable to derangement of function, and is a medium through which very powerful sanative impressions may be made upon the nervous and circulatory systems. The skin is not a mere covering for the body, but it is a vast emunctory for the elimination of useless or hurtful matters from the system, performing more in this way than any other organ in the animal economy, almost as much indeed as all the others taken together. Hence you see the importance of giving attention to the skin in all diseases, especially in those of an acute form, and still more especially in inflammatory conditions of the system. Not only does philosophy point to the skin as an organ upon which remedial measures may be employed with great propriety and benefit, but practical experiments and observation have demonstrated the efficiency of such practice. Such treatment then should be instituted in the management of inflammatory disease, as shall first effectually cleanse the surface from all filthy, unctuous, or other matter which clogs the pores, and otherwise impairs the cutaneous functions; and secondly, promote the activity of those functions until copious perspiration is established.

And gentlemen, you can not too highly appreciate this indication. When you remember that the skin in health, without any sensible evidence of moisture, does, by what is denominated the insensible perspiration, throw off from the system several pounds of matter daily, you will be prepared to anticipate highly important depurative results from such copious perspiration as may be induced with entire safety, by means familiar to any respectable practitioner.

It is sometimes *objected* to the course of treatment I have just prescribed for the arrest of inflammatory action, that circumstances are presented occasionally, where no time is allowed for the action of a cathartic, nor the establishment of perspiration. And we are asked, with perhaps an air of triumph, whether we would not then resort to the lancet? Certainly not. We have another mode of meeting such emergencies, more prompt, more efficient, more philosophical, and incomparably more safe. What! you exclaim, is there any measure upon which we may rely for immediate relief, as in case of severe congestion of the brain, or rapid hemorrhage from the uterus or lungs, tending to a speedy destruction of life? I assure you, gentlemen, that we have a

resort much more reliable in all such cases, than venesection is even claimed to be by its most tenacious adherents. The measure to which I refer is *hæmastasis*, or the controlling of the circulation by means of *ligatures* around the extremities. By this means you can withhold a very large amount of blood from the general circulation, without robbing the system of any portion of that important element, or in any degree impairing its quality. I have seen rapid and copious hemorrhage from the lungs promptly and effectually arrested by this means. In fact, the first case in which I applied the ligatures was one of this character; the hemorrhage ceased in a very few moments, notwithstanding the case was one of very formidable symptoms; and the patient's system suffered none of the injurious effects, which must have followed the abstraction of a sufficient amount of blood from the arm to have arrested the pulmonary hemorrhage.

The proper *adjustment of the ligatures* is a matter of much importance. They should be passed around the limbs near the body, and drawn so tightly as to arrest the circulation in the superficial veins, but not in the arteries. Should you compress the arteries so as to prevent the flow of blood into the limb, your ligature would of course do no good and might increase the difficulty. Where the effect is desired to be suddenly produced, and the symptoms require a very great impression to be made, all the limbs may be ligatured at once, and to the effect of retaining a large amount of the venous blood in them. When a less impression is required, part only of the limbs may be ligatured, or if all are tied, the effect may be regulated by making the bandage more or less tight. In this way you may produce any desired effect, even to syncope. In removing the ligatures, remember to do so gradually, so as to allow the blood to return by degrees, into the general circulation.

The *length of time* that the ligatures shall be kept on, will depend of course upon the circumstances of the case. As this measure is only employed for present effect, and to gain time for the employment of other remedies, as is venesection by its practitioners, it is seldom necessary to be continued long, though when necessary it may be repeated at pleasure. And herein is one great advantage of hæmastasis over venesection, that it may be employed on all constitutions, and repeated as often as necessity may require, whereas the abstraction of blood is entirely inadmissible in many cases, and in all it becomes more and more so by repeated bleedings. Another important consideration grows out of the fact that

we are all liable to error in the exhibition of remedies, but if upon applying the ligatures you find the measure will not be borne, to the extent you have carried it, you may correct your mistake, and all is right; but who shall return to the exhausted vessels life's vital current, when the too officious lancet has caused its escape? Instances are not wanting where practitioners would have given liberal premiums, to have blunders of this kind corrected.

Various *other measures* are employed, having for their object the protection or mollification of inflamed surfaces, such as local depletion, counter-irritation, revulsion, and so on, all of which will be more appropriately presented in connection with particular forms of disease. Let what has been said suffice, as a general outline of treatment of inflammation.

LECTURE XX.

LOCAL DISEASES.

Phrenitis or Inflammation: Preliminary remarks; Synonyms; Symptoms—First Stage—Second Stage—Third Stage; Diagnosis; Prognosis; Anatomical Characters; Reference to Phrenology; Further Research urged; Causes—Predisposing—Exciting; Treatment; Obscure Chronic Disease—Case; Neuralgic affections.

PHRENITIS OR INFLAMMATION OF THE BRAIN.

Preliminary Remarks. Having considered the subject of inflammation in its general outlines, we will now pass to the individual diseases which belong to the inflammatory group. In treating of the subject according to this arrangement, I am aware that I depart from the classification generally adopted in the books; but I do so, not with a view to be captious or eccentric, but because it appears to me more consistent with science and true philosophy, to associate diseases, in some measure, according to their manifest analogies, rather than group them as they may be developed in the same organ. Hence I shall now treat of inflammation in the various structures of the body, pursuing the subject from organ to organ, as may seem most in accordance with a natural arrangement. I shall commence with *Inflammation of the Brain*.

Synonyms. Quite a number of terms have been employed by different writers to designate this affection. It has been called phrenitis, from the mental derangement which attends it; encephalitis, meningo-encephalitis, and arachnitis, from the structures involved.

The term phrenitis, is perhaps more arbitrary than any other, but it seems less liable to misapprehension than any other, and I shall generally employ it as synonymous with inflammation of the brain and its membranes, having no reference to any particular locality.

There is so little difference, if indeed there is any at all, between the symptoms manifested during life, whether the brain *itself*, its

membranes merely, or both are inflamed, that no advantage can result from a separate consideration of inflammatory action in these different structures, at least so far as pertains to diagnosis; and as the affection in each and all of these portions of the encephalon, indicates precisely the same treatment, such a distinction is divested of all practical importance. Post-mortem researches may enable us to ascertain, in a given case, what particular structure or location within the cranium was the special seat of lesion, but we shall seldom find either the brain or its membranes extensively inflamed without the other being also involved. When we wish to designate inflammation of the meninges alone, we use the term *meningitis*, and when we speak of inflammation of the substance of the brain alone, we call it *cerebritis*. Where we desire to refer to inflammation of the serous covering of the cerebral mass we use the term *arachnitis* or *hydrocephalous*. I shall present all I have to say on inflammation of the brain and its appendages under the comprehensive term of *phrenitis*.

Symptoms.—First stage.—An attack of inflammation of the brain may occur very suddenly, or it may come on slowly and gradually. It is sometimes produced by exposure of the head to the direct rays of the sun in very hot weather. Persons under such circumstances may be suddenly attacked with such violence as to be unable to get home. But the affection generally commences by a more gradual progression of symptoms, constituting a kind of forming stage, as observed in other diseases. The early symptoms commence with a vague uneasiness in the mind; lowness of spirits; defective appetite; general debility and weakness; in some cases vertigo and dizziness; unpleasant sensations on changing position—as blindness and giddiness, with a tendency to stagger on rising from a stooping posture, and uneasiness in the head with confusion of ideas on lying down. Another early symptom, often, is a ringing in the ears, called *tennitus aurium*. These premonitory symptoms do not continue as long as the forming stage of fever, but usually long enough to admonish the individual of the approach of serious disease. In this stage of the attack the *pulse* is slow and full, but upon the first development of inflammatory action it will become rapid and small, with a hot skin and much thirst. These symptoms are usually preceded by a *chill*, which sometimes amounts to a “shake.” This will be accompanied by a severe *headache*, with more intense suffering than will be experienced after the disease shall have considerably progressed, and the inflammatory process

shall have blunted the sensibility. As the disease becomes fully developed, the *face* appears flushed and swelled, indicating great determination of blood to the head. The pulsations of the carotid arteries are rapid and forcible, often imparting a perceptible motion to the pillow upon which the head rests. The *eyes* have a very striking and peculiar appearance; in some cases they are bright and suffused with water; in others there is a wild, anxious expression, as if evil were foreboded; or the patient looks earnestly about him as if apprehensive that some one intends to do him injury, while his language will not express any such impression. The *tennitus aurium* will be increased perhaps until the sound will resemble the buzzing of bees, or the roaring of a distant waterfall. The *eyes* are painfully sensitive to light, and when it is allowed to fall upon the face suddenly, as by the opening of a door or a window, the head will be suddenly turned from it, and the eyes forcibly closed. This symptom may, indeed, be the first to fix the suspicion that inflammation of the brain has occurred; for all the other symptoms I have described may occur in an attack of fever, with much nervous irritation and determination to the head, without the cerebral lesion reaching the point of inflammation; but in such cases you will not find this exquisite sensibility of the eyes to light. Upon examining the pupil it will be found contracted, sometimes almost entirely closed, which is a very characteristic symptom, though in making the examination at different times, you should remember that the degree of contraction will depend, in a great measure, on the intensity of the light.

As in many other diseases, *constant restlessness* is an early symptom, which in phrenitis becomes increased by the intolerance of light, and the progress of the inflammatory action, and is soon associated with convulsive muscular movements; and with evidences of delirium, an invariable attendant on active inflammation of the brain. The pulse is hard, frequent, quick and occasionally irregular. The respiration is peculiarly affected, not hurried as in most febrile diseases, but sighing and irregular; and this is an important guide in distinguishing between inflammation of the brain and mere congestion of that organ in fevers. The skin upon the body is usually hot, while upon the extremities it is inclined to be cold, the capillary circulation is decidedly diminished, and the cutaneous functions partially or wholly arrested. Generally, the stomach sympathizes with the brain more than any other organ, in this as well as other diseases; consequently, nausea and vomiting

are frequent symptoms of phrenitis. Constipation, often very obstinate, is a frequent occurrence, owing to the diversion of sensibility from the organs under control of the nerves of organic life, during active inflammation in the cerebral center. Hence also, we find the urinary secretion greatly diminished, if not entirely suspended.

Second Stage.—As the *morbid action progresses*, a very great change of symptoms occurs. The delirium of the earlier stage subsides into a state of drowsiness or stupor, sometimes complete coma. There will be great difficulty in arousing the patient; the pupils instead of being spasmodically closed by the action of light, now become permanently dilated, and there is comparative insensibility to light. The hearing becomes very much impaired, and in fact all the sensibilities become blunted, if not entirely suspended. The convulsive muscular movements are often modified into subsultus tendinum; and the patient picks at the bed-clothes, or reaches about as if trying to grasp something in the air, in the manner described while treating of typhoid fever. Sometimes there is rigidity of the muscles, with perhaps contraction of the fingers or toes, or a whole limb. This indicates very severe cerebral lesion. The pulse changes from frequent and small, to the slow, sluggish and full pulse common to apoplectic and comatose conditions. If it is intermittent, this may be regarded as an unfavorable symptom, indicative of extreme cerebral oppression.

The urine is generally very nearly suppressed, but if the secretion go on, it is apt to be retained and greatly distend the bladder.

Third Stage.—At last the *vital powers are overwhelmed* by the progressive march of the inflammation, and begin to give way. Another change now occurs in the symptoms. The pulse, which in the beginning of the inflammatory action was rapid and quick, and became slow and depressed in the second stage, now becomes very rapid and small,—not so hard as in the first stage, but hurried and irregular. The surface appears sunken and collapsed, and the capillary circulation is entirely arrested; the countenance looks haggard and cadaverous, a cold, clammy perspiration appears upon the skin, and the patient insensibly sinks into the arms of death.

Such is an outline of the usual course of a fatal case of inflammation of the brain. The symptoms, it may be remarked, vary in different cases, in accordance with constitutional peculiarities of the patient, the violence of the attack, and the complications

attending it. It is probable also that the violence of the symptoms, such as rigidity of the muscles, drowsiness and insensibility, depends in some measure upon the involvement of the deeper cerebral substance, and that where the case falls short of these manifestations, we may suppose the inflammation to be principally confined to the membranes and periphery of the brain.

The *diagnosis* of phrenitis may be more difficult than you would at first thought suppose. The phenomena presented by many febrile attacks are very similar to those which generally mark the commencement of encephalic inflammation. Generally however, there will be something in the history of the case, or some additional symptoms or circumstances which will enable you to distinguish phrenitis from such diseases as bilious fever, typhoid fever and small-pox. If not at first, diagnostic symptoms characteristic of these individual diseases will soon make their appearance, and demonstrate the character of the attack. Simple inflammation of the brain will lack those general and peculiar symptoms which have been described in speaking of fevers—especially in the second stage, and the distinction will be more and more easy as the case progresses.

Delirium Tremens is perhaps more liable than any other affection, to be mistaken for inflammation of the brain; and scarcely any other mistake is more likely to be attended with unfortunate consequences. The active treatment requisite in acute phrenitis would generally sink a patient laboring under delirium tremens beyond recovery, the opposite course of treatment being the only hope in the latter disease. Here again the history of the case is important. If the individual have been addicted to intemperate habits, or should the smell of alcoholic liquors be detected in his breath, suspicion might be entertained that the difficulty was *mania à potu*. But if so, it will be characterized by peculiarities differing from those of inflammation; such as horripilation and fearful foreboding of evil, or a sense of alarm and terror at some imminent danger actually present. Enemies present themselves in a thousand different fantastic forms; myriads of bugs, reptiles, and snakes are seen crawling about and upon his person; perhaps an infuriated clan of demoniac forms, armed to the teeth with dirks, bowie-knives, bludgeons and firearms are seen skulking in the corners of his room, meditating blood and murder on the helpless victim of their malice; or perhaps your patient assumes the office of mediator between contending duelists, and seeks to reconcile

have more direct and intimate sympathy than those lying in actual contact.

In case of a *blow* or other *external violence*, the dura mater is quite as liable to inflammation as the other structures, and in that case is frequently found separated from the bony structure, and the surface of the skull is left in a smooth, slippery condition, and whiter than natural, while the membrane itself may be merely injected so as to appear reddened and thickened, or it may be in an ulcerated or even gangrenous state. Occasionally it is covered by a layer of lymph or pus. The arachnoid more rarely escapes being involved to some extent in cerebral inflammation, yet it seems to be remarkably exempt from structural changes or disorganization. It is sometimes found perfectly sound, transparent and glossy, with both its surfaces covered with pus. It is often however, injected, and somewhat opaque, and covered by a deposition of lymph. The effusion of lymph may be found between the dura mater and arachnoid, in the cavity of this membrane, or between it and the pia mater. Sometimes the arachnoid is found dotted with little particles of red matter, and occasionally it has a rough feel under the finger. This dotted appearance is usually found to accompany the active stage of inflammation of the brain, and it will be observed generally, where copious effusion has taken place into the sub-arachnoid space and cellular tissue. In such cases the fluid effused will escape when the serous membrane is punctured. This effusion is in the folds of the pia mater, between the convolutions; and when the fluid portion is thus allowed to escape, by puncture of the arachnoid, such portions of lymph or pus as may have become concrete, remain involved in the cellular tissue of the pia mater and have the appearance of yellowish patches. Sometimes a layer of concrete pus or lymph may be found between the two surfaces of the arachnoid, resulting without doubt from an altered condition of the fluid usually secreted by this membrane. The function of the arachnoid is evidently to secrete a serous fluid to lubricate its smooth opposing surfaces, and thus prevent friction and adhesion, while freedom is allowed for all the changes of position in the brain, required by the motions incident to the circulation of the blood, and mental exercise. That motions of both these descriptions occur in the brain can not be doubted with reason. I had an opportunity on one occasion, of observing such motions to occur in a remarkable degree. Sometimes a considerable quantity of serous fluid, generally rendered

turbid by lymph, pus, and perhaps blood, is found in this cavity, and also in the sub-arachnoidean space, and in the ventricles. This is more likely to be the case where the inflammation has approximated the chronic character.

The pia mater is reddened, and often adheres with so much tenacity to the surface of the brain, that the latter will be torn, in an attempt to separate them. The surface of the brain is almost always in an altered condition. Sometimes it is softened where the inflammation of the meninges has been protracted, but generally it is hardened where the membranes have been the principal seat of inflammation. Upon cutting across the fibers in the substance of the convolutions, many bloody specks or points will be observed, but where the incision is made parallel with the fibers, there will be a streaked appearance, indicating in either case the engorged condition of the minute blood-vessels, which ramify through the medullary substance.

Scarcely ever are the ventricles of the brain found free from accumulations of serum. The amount however, varies greatly in different cases.

The medullary substance of the brain frequently undergoes material changes. It is sometimes so softened as to be easily scraped up with the handle of the scalpel, presenting the appearance of lard. It requires much experience however, to be able to detect the evidences of disease in the substance of the brain. Indeed, notwithstanding the many minute post-mortem examinations of this organ which have been made by skillful pathologists, comparatively little is known which throws light upon the nature of phrenitis, by which we may be guided in diagnosis. Even the most formidable, raving insanity, may leave not a trace of disease in the brain or its meninges, which shows that the condition of this organ in disease is very obscure. It is supposed by some that insanity may be simply a functional disturbance, without any physical disorganization or structural disease. But this seems to me to be improbable; I can not suppose so palpable a disease as insanity to occur without some physical change in the cerebral organs, but in what that change consists we are often unable to determine, from our want of knowledge of the minute structure of the cerebral substance.

Many efforts have been made to discover some constant relation between the external manifestations of disease and the different localities of diseased action in the brain, and thus enable the prac-

titioner to form accurate opinions, in the various cases which may be presented to him, as to the precise location, extent and degree of inflammation. Very little reliable information however, has been gained by these efforts. The researches of Gall and Spurzheim, and their successors in the department of phrenological science, seemed to justify the hope that something might be gained for practical medicine in this way, and it is very probable that such may yet be the case. Phrenology has demonstrated the fact that the brain consists of a plurality of organs, adapted to the exercise of a like plurality of faculties of the human mind; and if each mental power has its appropriate cerebral organ, it seems not at all improbable that each corporeal function and action is under the control of some special organ also. Many experiments have been instituted to establish the doctrine that different portions of the brain influence or preside over different parts of the body. Some have attempted to show that the periphery of the brain presides over the mind, and the deep structures over the body.

The decussation of the fibers of the medullary substance in the medulla oblongata, has led many to believe that the functions of each side of the body may be governed by the opposite side of the brain, and experiments and observations seem to justify the idea. So that muscular rigidity, spasm, or paralysis on one side, is thought to refer with some certainty to lesion of the opposite side of the brain. Some experiments of physiologists seem to establish a sympathetic relation between the cerebellum and the genital organs, as determined by contractions of the spermatic cord when the cerebellum is mechanically irritated, by priapism when that organ is in a state of inflammation, and by the tendency of undue sensual indulgence to produce cerebellar inflammation. But the observations of others seem to discredit these suggestions and deductions, by showing that affections of a local or general character,—such as “softening of one of the corpora striata, one of the optic thalami, the anterior lobe, the middle lobe, a deep point in the white substance, a cerebral convolution,” and even “a whole hemisphere,”—have occurred, where there was “nothing in the pronunciation, in the derangement of movement in the arm or the leg; nothing in the state of the intellectual functions,” which seemed to permit a suspicion as to the limits of the part affected.

Some have even tried in this way to cast discredit upon the whole science of *phrenology*. In opposition to the doctrines of

phrenology it has been alleged that portions of the brain, represented to be the seat of certain mental faculties, have been destroyed, without in the least affecting those faculties. But since the brain is a double organ, and consequently each faculty has two organs located in corresponding positions, one on each side of the mesial line, it is very easy to understand how the function in any case might be carried on by one organ, after the other had been destroyed, just as one eye can see after the other has become blind. But even should both the organs assigned to a particular faculty be obliterated, and the mental manifestation of that faculty appear unaffected, the fact would not necessarily disprove the correctness of the phrenological hypothesis: for we may readily suppose that some kindred organs might assume and perform vicariously the function of the one which had been destroyed. Such substitution is not unfrequent in other parts of the system. The biliary, the renal, and other secretions, have been vicariously carried on after the proper organs have been destroyed, or rendered useless. The substitution in the brain of one organ for another, where the faculties concerned were very nearly alike, would present even less difficulty to our minds, than some of those adaptations of secretory organs to new functions. Yet I do not believe there is any well attested case of a complete destruction of the same organ in both hemispheres, without disturbance of the mental faculties. Phrenologists have challenged the world to produce cases of the kind; and although examples of extensive injuries have been brought forward with an air of exultation for this purpose, yet in every instance, so far as I have been able to learn, the results have, to some extent at least, sustained phrenology.

But to return from this digression, I will remark that this whole subject of the effects of inflammation upon different portions of the brain, and the relation, not only of different localities but of different degrees of inflammatory action, and of different anatomical characters,—such as softening, induration, etc.,—to the external symptoms, lies open for *research and investigation*. Very little of practical value has yet been determined,—hence I will not detain you with the results of hitherto unsuccessful efforts, but would urge you to give your attention to this subject in the spirit of true friends of science and votaries of truth, bearing in mind that the most formidable mountain which presents a barrier to your progress, may yet offer you a “pass” through some hitherto undiscov-

ered ravine; or at least that you may construct instrumentalities with which to scale its summit or tunnel its base, and explore the land of promise beyond.

The *causes* of inflammation of the brain are various. They are spoken of by authors under the ordinary divisions of *predisposing* and *exciting* causes. The predisposing causes are somewhat indefinite and unreliable. Age is found to have much to do with the predisposition to phrenitis,—children under two years of age, and persons between the periods of puberty and the decline of life appearing to be most liable to this affection. The liability diminishes after the second year until puberty, and again diminishes after about the forty-fifth year. A sanguine temperament, plethora, intemperance in eating and drinking, and excessive mental exertion, have a predisposing tendency to cerebral inflammation. It is most frequent in hot climates also, and it sometimes prevails epidemically. It very rarely however, occurs as a spontaneous or independent affection, but it is not at all unfrequent as the result of accident, or the attendant of general or local disease.

It is scarcely necessary to attempt a statement of the *exciting causes* of this affection, and yet a few remarks under this head may not be out of place. It is said that a sudden exposure to a draft of air, will sometimes produce inflammation of the brain, where there is a hereditary tendency or predisposition from other causes to this disease. I have seen cases caused by exposure to heat, and it is not improbable that cold may have a similar effect. Blows, concussions of the head, etc., are frequent causes of cerebral inflammation. But it more frequently occurs as the sequel or metastasis of some general or local disease, such as rheumatism, gout, erysipelas when located on the scalp, etc. A case of erysipelas recently occurred under my observation where there was a determination to the brain, which had it not been promptly arrested, would most certainly have resulted in active inflammation of that organ. I need not repeat that some parts of the body remotely situated from each other, are more nearly related in nervous sympathy than others lying in contact or close proximity. Hence, as we might expect, the brain is often found to suffer from affections of the skin, stomach, bowels, etc. The tendency of cholera infantum to result in cerebral inflammation is a striking instance of this kind.

We come now to speak of the *Treatment*. In this as in other grave forms of disease, the paramount question is in regard to the

cause; for to attempt the treatment of a case without any knowledge of the cause, is like attempting navigation without chart, compass or landmark. Better leave the case to the powers of nature, unless you can gain such a clue to the cause and character of the difficulty as to avoid the risk of inflicting injury by inappropriate medication. This remark applies with equal force to all forms of disease.

Though emetics are generally contraïndicated in this affection, from their tendency to determine the blood to the capillaries of the brain, as well as other portions of the system, yet were I certain that the affection were connected with, or depended upon accumulations in the stomach, I should promptly evacuate that organ by an emetic; and in some instances this is about all that is required. In the selection of an emetic to be employed under such circumstances, it is important to choose one that will operate quickly, thoroughly, and without prolonged or continuous retching after the stomach has been emptied. I object as a general rule to impalpable powders, which are apt to become attached to the villous coat of the stomach, and keep up a state of irritation, which may be difficult of removal. I much prefer to give an emetic in the form of an infusion, and I know of no better formula than the one I have already mentioned on several occasions, embracing a combination of Lobelia and Eupatorium. As was remarked, emesis in this affection is generally regarded as inappropriate, and unless palpably required by the necessity of the case, it should not perhaps be employed. I think however, that the objection to this measure, as generally urged, is rather assumed than real: at least when I estimate the influence of an emetic on the brain and general system, I am unable to feel the force of the objection. In fact the relaxing and sedative influence of an emetic is often very desirable in just such a case as the one under consideration. There is a temporary forcing of the blood into the whole capillary system, but the effect appears to me to be an equalization of the circulation rather than a special determination to the brain.

The next important indication is to evacuate the bowels, provided the cause and nature of the disease permit this measure. Cathartics exert a powerful influence in attracting the circulation from the brain by their derivative effect. Nor should we depend on mild cathartics; they should be of the active and thorough character. I have found our antibilious physic, not in sufficient doses to produce vomiting, to answer an excellent purpose. It

should be repeated to the extent of producing thorough evacuation. You can in this way detract from the circulating mass, more than could be done by a full bleeding. The only argument in favor of bleeding is its immediate effect, but this is more than counterbalanced by the injurious consequences which follow the measure. You know that I have already abundantly shown that depletion by the lancet takes from the blood its vital element, fibrin, in a very large proportion, and produces an increase in the serum, and thus renders it unfit for circulation in the minute capillaries. And you recollect that bleeding is not claimed to be generally a curative measure; it is a mere temporary expedient, which I have sufficiently proved should never be employed.

Topical bleeding, by cupping the temples and nape of the neck, is not objectionable, but is often of great utility, affording relief by local depletion, while the quantity abstracted can inflict no serious injury on the circulating fluid. This measure may be repeated two or three times daily until the active symptoms are subdued.

Simultaneous with the means I have mentioned, you may, if deemed necessary, resort to the application of ligatures on the limbs in the manner described under the head of general treatment of inflammation. By this means you give much more prompt and certain relief to the engorged parts than could be effected with the lancet, and that without the loss of a drop of blood.

Another important means is that of cooling applications to the head. You will find in almost all your books the use of ice and ice-water recommended to be employed for this purpose; but I much prefer a very different mode of management, and one based upon strict principles of philosophy. Cold applications serve to give momentary relief by benumbing the sensibility for the time, to be followed by a more severe reaction. But the application of warm water, has a calming, soothing influence upon the nervous system, and from its more rapid evaporation, is far more effectual in reducing the temperature of the parts. I have seen that restlessness, so characteristic of inflammation of the brain, completely overcome, and the patient calmed down into a quiet sleep, from the application of warm water to the head, followed by a very gentle fanning to promote its evaporation. I was formerly in the habit of applying ice, cold water, cloths wrung out of cold water, etc., to the heads of my patients, but I find far better effects follow my present method.

Another potent and effectual means of diverting the circulation

pieces of cloth and forced them into its ear, notwithstanding it had on the first occasion experienced much pain from the local irritation and the operation of removing the pieces, and had withal been pretty severely chastised. But there are similar causes, over which neither the child nor adult can always have control. I refer to the fact that bugs, flies, and other small insects occasionally creep into the ears, causing a great deal of annoyance to the patient and sometimes producing severe inflammation. Another very common cause is an undue or morbid secretion of the cerumen aurium or earwax. I have seen this the case a number of times, and to a very great extent. I recollect the case of an old man who gradually became deaf, but as it was not at first accompanied with much pain, he supposed his deafness to be the natural result of age. But finally it became really painful, and he came to me for an examination. I discovered by means of the speculum, that the ear was filled with this morbid secretion, in an inspissated condition, and succeeded in removing a plug of it, as large in circumference as my little finger.

Scarlet fever is a very common cause of otitis, and as a sequel to that disease it is often very troublesome. The communication between the tympanum and the pharynx, through the eustachian tube, will readily account for the phenomenon. The inflammation extends from the tonsils by continuous sympathy on the mucous membrane lining that tube, and thus reaches the drum of the ear.

In the *treatment* of this disorder, as in that of all other diseases, the first object to be accomplished is the removal of the cause that produces it. If it is occasioned by the presence of a foreign body in the ear, remove it. This however, is sometimes difficult to accomplish, and your utmost ingenuity may be taxed to devise a successful method. The first case which ever gave me much trouble, was that of a child that had introduced a pea into its ear. The pea had become swelled very much, and the ear was so sensitive, that the slightest touch produced pain. I had recourse to all the measures which I remembered to have seen recommended in the books, without success. Among the numerous expedients recommended is that of introducing a probe tipped with stiff honey to which the object may adhere with sufficient tenacity to enable you to extract it. But it failed in this case, as the pea was so much enlarged, and the parts so much swelled, as to require more force for its removal than could be exerted in this way. It then occurred to me that water thrown forcibly against

the tympanum would by its momentum expel the pea. I tried the experiment and it succeeded at once. I have used the same means with invariable success in removing substances which had got into the ear, and also the inspissated secretion of the lining membrane of the meatus. Sometimes the substance is expelled with sufficient force to carry it some distance. The water should be thrown in by means of a small syringe, and should be repeated until the object is accomplished, though very often the first impulse will be sufficient. The syringe should have a slender pipe, and be so introduced as not to obstruct the passage. The water may be thrown in with considerable force. Having removed the exciting cause the inflammatory symptoms will indicate such further treatment as may be required.

In an ordinary case of otitis, *resulting from cold*, a thorough sweat, with warm applications to the ear, such as the steam of a decoction of hops, will usually give relief, unless the inflammatory action has gone too far. If there be general derangement, a moderate cathartic is indicated. For this purpose the Seidlitz powders repeated every two or three hours will do very well; continuing in the meantime hot fomentations to the ear. Where there is much pain I have found tobacco smoke to afford very prompt relief. It may be blown into the ear through the stem of a common tobacco pipe. The bowl of the pipe may be filled half full of dry tobacco; which should then be ignited, and a silk handkerchief placed over it. By applying the mouth to this a stream of smoke may be blown into the ear of the patient with facility. This will generally afford temporary relief, but you must continue your efforts to reduce the inflammation, and thus prevent a recurrence of the pain. A cup applied under the ear is very beneficial. A roasted onion put into and upon the ear is an excellent application. For the purpose of immediate relief from suffering, I have often dropped into the ear a small portion of the sudorific tincture mixed with sweet oil.

In cases where there is palpable *derangement* of the *stomach*, it is sometimes necessary to give an emetic; and you may do more by this means perhaps, in an hour, than would be affected by cathartics in a day. You will often find that the stomach has ceased its functions, is overloaded with irritating substances, and from its influence upon the whole system, certainly requires attention. A thorough emetic will relieve the stomach, equalize the circulation, and induce a free perspiration.

then disappeared from that eye. He soon however, began to have pain in the other eye, and that too began to swell as the other had done. He was brought to the city and placed under the care of a celebrated oculist. There he was salivated and received other treatment, but with no advantage. The attending physician requested me to see the case with him. The lower lid was entirely everted, looking like a fungus growth upon the cheek, as large as a filbert. The eye was projected almost beyond the external boundaries of the socket, though the ball itself was not much inflamed. The pupil was permanently dilated to nearly the size of the cornea, and the power of vision was gone. He could barely recognize slightly the impression of light on turning his face to the bright glare of a window. The pulse was small and frequent; the pain in the eye was severe all the time, but more particularly so in the after part of the day.

I became satisfied that it was a case of *neuralgia*, and advised the use of quinia and iron, as I have heretofore recommended for that affection in my lectures from this chair. I also advised the bathing of the eye with warm water, followed by a gentle motion of a fan. Under this treatment alone the swelling diminished, the eye sank back into the socket, and the lid returned to its natural position. The inflammation disappeared and the function of the eye was gradually restored.

STOMATITIS, OR INFLAMMATION OF THE MOUTH.

Preliminary Remarks.—I propose to occupy your time still further in the consideration of what may be regarded as minor diseases: I refer to the different forms of sore mouth. We sometimes meet with affections of the mouth which may not be properly regarded as inflammatory diseases, but which have a highly irritative character that assimilates them very nearly to this class of diseases; and there is perhaps, no position in the arrangement we are observing, where they may be introduced with more propriety than here.

I shall first speak of *Inflammation of the Mouth*, or *Stomatitis*. You may perhaps think that I am going to consume time now with an unimportant disease, but your experience will be different from mine, if you do not find your patience, skill and ingenuity, as often and as greatly taxed by what may be regarded as trifling affections, as with those of a more formidable character.

According to my experience, inflammation of the mouth is never

an *idiopathic* disease, for where it has not been caused by local injury,—as scalding, corrosion of the mucous membrane, or something of that nature,—I have always been able to refer it to some other affection of the system, of which the inflammation was either a symptom or a result. It is very frequently a sequel of measles, or scarlet fever, or some other protracted disease of a febrile character, in which gastro-intestinal irritation is a prominent feature.

Symptoms.—The tongue in many cases has a speckled or striped appearance; some portions of the surface being covered with a white substance resembling curdled milk, while in spots or streaks the surface will be bare and of a fiery red color. The white coat just mentioned does not lie loosely upon the tongue, but adheres closely, and is probably the epithelium in a deadened condition. In other cases the whole tongue will be red, smooth and glossy as a varnished surface, and almost destitute of moisture; while in others it will be equally red and smooth, but quite moist. Indeed these appearances are not confined to the tongue, but may extend to the whole mucous covering of the mouth. In some instances, instead of the smooth surface, the papillæ will be so engorged as to produce prominences, giving the mucous surface a rough appearance.

These differences of appearance and condition of the mouth when inflamed, have always appeared to me to depend very much upon the state of the stomach and general system, as affected by other diseases, so that, as before remarked, I never regard it as an independent or *idiopathic* disease. In some cases, the inflammation not only occupies the whole surface of the mouth, but extends throughout the entire mucous membrane of the alimentary canal. As a general rule indeed, you will find the tongue a pretty sure index to the condition of the stomach, and a diagnosis based upon its appearance is not very likely to mislead you. Thus, where the tongue presents a heavy coat, we are generally safe in concluding that there are accumulations producing gastric derangement; but if the tongue is red and clean, or nearly so, we may usually be sure that there is a similar irritated condition in the stomach, and you will find such an inference confirmed by tenderness in the epigastrium, upon pressure being made. But there is one condition of the tongue which may mislead you; and that is, where a heavy coat exists upon it while the membrane beneath is inflamed; its condition being hidden by the fur on the surface. This may be the case when there are no accumulations in the stomach or

bowels, but it will gradually come off, leaving the mucous membrane of the tongue, and perhaps other parts of the mouth, red and inflamed. I always suspect irritation when the coat has an unusually thick and scaly appearance.

Causes.—Inflammation of the mouth to a greater or less extent may result from local irritation, as where a scalding drink, or a strong acid or alkali has been taken into the mouth through carelessness or mistake. It may also be produced by carious teeth, which always throw out unhealthy and irritating secretions. Where the inflammation results from a local cause, it is seldom so severe as to produce much general febrile excitement; and will be amenable generally to appropriate local applications.

As to *treatment*, it is obvious that much will depend on the origin of the affection. If it be the sequel of scarlatina or measles, very little need be done. Constitutional remedies will mostly be out of place; and your reliance must be upon a plain diet, and soothing applications to the mouth, and stimulating fomentations over the stomach. A decoction of *hydrastis canadensis* will be found an excellent remedy in such cases, for though it does not possess astringent properties, it seems to exert a peculiar, I might say specific influence in allaying inflammation in mucous surfaces. Let a portion of the decoction be taken cold, into the mouth, and retained until a copious flow of saliva and a slightly stinging sensation is produced. In general terms it will be sufficient to say, that where the sore mouth is dependent upon constitutional derangement, such general treatment must be instituted as is appropriate to the condition of the system, and local applications should at the same time be employed calculated to give comfort to the patient, and allay local excitement. If the affection is caused by a local irritant of any kind, little or no general treatment will be necessary, except such as was before referred to; a simple diet and attention to the condition of the stomach and bowels, so as to prevent accumulations. Time will generally effect a cure in these cases after the irritating cause is removed. Carious and snagged teeth should be removed, where these cause the difficulty, and the sound teeth cleansed from all accumulations of tartar. The solution of *hydrastis* or other soothing wash may aid in the cure.

There is another remedy which I have employed more than any other in this and other forms of irritation of the mucous surfaces, especially where a tonic seemed to be indicated, as is usually the case if the disease is a sequel to some form of fever. I now refer

to the staphylea, of which I have spoken before. It acts as a pure tonic without producing the least irritation, even where the mouth and stomach are in a stage of inflammation. The infusion should be given three or four times daily in tablespoonful doses. You need not look for any palpable and immediate demonstration of its action, for its impression is so gentle and gradual that you may be led to question whether it is really entitled to any consideration; but I have seen cases treated with and without it, and have clearly observed decided advantage in the cases where it was used.

THRUSH, OR INFANTILE SORE MOUTH.

There is another variety, so to speak, of inflammation of the mouth, resembling that just considered in some measure, but peculiar to infants. It is usually called "THRUSH," and occurs in children from a few days to three or four months old.

Symptoms. At the beginning of the affection, small white specks are first seen, not much larger than the point of a pin. It most frequently commences in little clusters of these points on the inner side of the under lip or cheeks, but it may begin at other places. These little clusters gradually spread until the entire surface of the mouth is involved; the small points being magnified to the size of a pea in circumference. You will most generally find spaces throughout the mouth which are bare and red; but I have seen cases where the whole surface was covered with the white coat, very much resembling milk curd. This I regard as deadened epithelium, and this conclusion is justified by the fact that you can not wash it off; but when it has remained long enough for another epithelial layer to be formed it will come off itself. But no attempt should be made to wash it off, as by doing so you will aggravate the inflammatory action. You would naturally suppose that the infant's mouth in such a state must be very sensitive; but instead of this, there is very little soreness, even after the scurf comes off.

The affection is sometimes communicated to the breast of the mother or nurse, which will become very sore; and in some cases the nipple is nearly covered with what is called canker of the breast. This proves that the mucous secretions are vitiated and irritating. The inflammation often extends to the fauces of the child, and the pharynx, the esophagus and portions of the stomach and bowels have been found covered by this curdy coat, or in the inflamed condition following its separation from the mucous membrane.

The peculiar wisdom of practiced nurses seems to enable them sometimes to anticipate an attack of this disease, in the inclination of the child to sleep a great deal; and such a condition may possibly generally precede the development of the affection. But any child that is healthy, and gets suitable nourishment, will while very young sleep most of its time, so that you need not always expect to find the development of "thrush" to follow this disposition to sleep.

This disease sometimes results from unhealthy milk, or from the overgorged stomach becoming deranged by the indigestion and fermentation of aliment taken in too large quantity. In short, whatever may be the extent of the disease, or the character of its other symptoms, you will always find evidence of an acid condition of the stomach and bowels, in the green color and peculiar odor of the evacuations. Where the case is very severe, the morbid condition seen in the mouth evidently extends to the stomach and bowels; the anus will be red and excoriated, and portions of cast off epithelium are sometimes found in the discharges.

This form of disease may be considered then without doubt, to be dependent upon prior derangement of the stomach and bowels, and the *treatment* will be directed to this condition as presenting the first indication. The accumulations in the bowels must be removed by a gentle purgative, but in its administration remember that you are treating a delicate infant, and that all harsh or drastic medicines are to be avoided. Use only mild aperients, such as will remove the contents of the bowels, and at the same time neutralize acidity. I have found our neutralizing physic better adapted to these cases than any other. Combining, as it does, the properties of a cathartic, antacid and carminative, it accomplishes both the objects just named, and relieves the colic pains so generally present in this condition. This medicine should be given in moderate doses every two or three hours, until a number of discharges have been produced by it, and then repeated daily to the extent of correcting acidity and keeping up a regular action of the bowels. Local applications are of little use; for while the derangement of the alimentary canal continues, they can have little beneficial effect. Too much "washing" of the mouth is very likely to irritate rather than cure.

Another matter of great importance in the management of this disease is the *condition of the mother*. You will find in many cases that the bad diet of the mother, producing an unhealthful quality

of milk, is the origin of the difficulty. You will of course in such a case enjoin a suitable change; prescribing a simple and proper diet, and proscribing every thing calculated to produce acidity of the stomach. It can not be disputed that the child will be affected by food or medicine taken by the mother. I have seen the infant actively physiced by its mother's taking a cathartic. We see this influence of the food on the milk illustrated in the lower animals. Who is not aware of the effect of leeks and other kinds of vegetables on the milk of cows?

There seem to be some constitutional *peculiarities*, perhaps I might say *idiosyncrasies*, which cause the milk always to disagree with the child, so that it will never be healthy so long as it is kept at the breast, although the mother's health may appear to be perfectly good, and her diet wholesome and judicious. In such cases I have the child weaned or nearly so, substituting simple nourishment for the mother's milk, allowing the child to take very little of the latter, if any at all.

You will find among *nurses* a vast number of articles recommended as *washes*, such as privet or sage tea, honey, etc., any of which may perhaps be used with some advantage as a means of soothing the local irritation. It matters not much what is employed so that the child's mouth is not irritated by too much "swabbing." Where it is thought proper to use any thing, I find the infusion of *hydrastis* answers a better purpose than any thing else. Where the irritation has extended to the stomach and bowels, I have administered with advantage small doses of salad oil, which is the purest kind of olive oil. If a rancid article be given it may aggravate the case.

CANCERUM ORIS,—CANKER, APTHÆ, OR ULCERATIVE INFLAMMATION OF THE MOUTH.

We have another form of sore mouth not peculiar to children, but occurring at any age; I refer to *apthæ*, canker, or *cancerum oris*. This is an ulcerative inflammation of the lining membrane of the mouth. Some authors attempt to make a distinction between canker and *apthæ*, but in my view this is an impracticable attempt at refinement in description.

Symptoms.—This commences frequently in a single spot, generally upon the tongue in a little blister, though perhaps the first thing that will be seen is a deep canker with irritated edges, varying from the size of a small pea to that of a dime in diameter.

The surface of the canker has a yellow color and the edge red. In some cases the surface of the mouth is covered with these little sores; which are exceedingly painful. One sore will often produce more suffering than some very formidable forms of disease, though the general health of the patient may appear to be good.

The suffering must of course be much greater where the ulcers are so numerous. I have seen it so severe, that even water taken into the mouth produced intense pain, and it was almost impossible to swallow or move the muscles of the face. The affection not only extends sometimes, as was remarked, throughout the mouth, but into the throat as far down as you can see, and I have seen cases where I had no doubt, the mucous membrane of the stomach and bowels was more or less occupied by similar sores; the discharges clearly indicated such to be the case.

Treatment.—This affection is invariably dependent on derangement of the stomach and bowels, especially the former, and will be relieved generally by treatment adapted to the correction of such derangement. In adults I have used the antidyspeptic pills, which do not induce watery evacuations, but merely free discharges of the contents of the bowels. Of course, then, they do not reduce the serous portion of the blood, but they will by one or two operations more thoroughly empty the intestinal tube, than would half a dozen operations of hydragogue cathartics; and so far as this disease is concerned this is an important consideration. For children, I have been in the habit of using our neutralizing physic, repeating it often enough to secure free evacuations. I have found some cases of both adults and children, where I thought best to give an emetic in the early stage of the difficulty, as by this means accumulations which evidently occupied the stomach could be at once removed, when it would probably have required a day or two to carry them off by catharsis; and I advise you, whenever you find the stomach evidently overloaded, to premise your other treatment by free emesis.

In many cases you will find the parts immediately involved in the disease so inactive as to require stimulation, before other local treatment will have much effect. A favorite remedy with me in such cases, is a gargle of common salt, pepper and vinegar. An infusion of the *polygonum punctatum*, or *smart weed*, is another excellent remedy, and one which I often prescribe. It has a stinging, pungent taste, followed by a comfortable glow of heat through the mouth. You may follow with the infusion of *hydrastis*, which

seldom fails of producing an excellent effect. I have found a good influence, where there were but one or two cankers, from the use of burnt alum and loaf sugar, finely pulverized and applied to the sore, or the cankered spots may be slightly touched with the nitrate of silver.

I hope I shall be pardoned gentlemen, for dwelling so long on these apparently unimportant affections, but I have so often seen cases most shamefully treated by members of the medical profession, that I can not feel that my duty is discharged until I shall have put you in possession of my views of their proper management.

NURSE'S SORE-MOUTH.

There is still another variety of sore mouth entirely distinct from all others. It is called the *Nurse's Sore Mouth*, and it is a difficult affection either to explain or treat.

Symptoms.—The symptoms are not as severe as those of some other affections of the mouth, still it is the occasion of much inconvenience and suffering. This too, is an ulcerative inflammatory affection, but the ulcers are not so deep-seated, but are seen in little patches, without much appearance of redness; and are very painful, owing to the exalted sensibility of the parts involved. Accompanying this affection there is, in severe cases, a general prostration of the vital powers; a pale, anemic condition of the system; the lips will be pale, the extremities cold; and all the symptoms show a decided deficiency in the process of nutrition, and of the secretion designed for the support of the child. Yet it is remarkable that the child very frequently appears to be perfectly healthy.

Treatment.—The only remedy I have ever found for a severe case of this disorder is to wean the child. This will arrest the secretion of milk and allow the system to resume its nutritive function. Where the disease is not very alarming, much benefit may be derived from the use of tonics, to sustain the digestive function and improve the general tone of the system, even without entirely weaning the child. When the secretion of milk is arrested, the catamenial discharge is very likely to return; and the female is liable to become pregnant again. This is an objection to weaning the child when it can be safely avoided; for the frequent recurrence of pregnancy and parturition, so common with females who do not nurse their children at the breast, does more to break down

their constitutions than moderate lactation would be likely to do. Still, where the patient is sinking under this disease, it is better to take the child from the breast at once.

I have spoken of tonics to sustain the patient where it is not decided to wean the child. They will also be very useful in restoring the tone and energy of the system after the infant has been weaned. In either case quinia and iron form an excellent prescription, the former, to produce healthy and vigorous digestion, the latter to assist in increasing the vitality of the blood. I have also found great benefit from the use of staphylea, and other mild tonics, and I have employed with good effect the infusion of hydrastis. This latter article will not only reduce the irritation, but will slightly move the bowels. Dr. H. D. Holt, of New York, states that iodide of potassium, given in five-grain doses three times a day, has uniformly cured this disease in forty-eight hours, so far as tested under his notice. Dr. R. Wilcox claims equal success with a wash made by boiling an ounce of the dried leaves of *polygonum punctatum* or *hydropiperoides* (*smart weed*), in a pint of water for twenty minutes, and applied to the affected part every hour through the day.

[Having become convinced that this affection always depends on a vice of the constitution of a scorbutic character, I commenced, about three years ago, treating nurse's sore-mouth on the anti-scorbutic method, and have continued to do so with the most gratifying results. My attention was first called to this view of the case by M. L. Knapp, M. D., of Cincinnati, who has since published a very interesting monograph on the subject. He did not furnish me with any details of treatment but merely gave me his conception of the pathology of the disease, which struck me so favorably that I resolved to test its correctness by treating the first case that should come under my care, as a case of scurvy. I did so, and with success. Several very bad cases have since come into my hands all of which have yielded to antiscorbutic treatment. Two of my patients, who had previously been compelled to wean their infants when but a few weeks old, have each been enabled to nurse a child during its first year.

As a prophylactic regimen, the woman who apprehends this disease should, during gestation, partake freely of wholesome vegetables, such as potatoes, cabbage, beans, tomatoes, ripe fruit, etc., with a moderate quantity of fresh meat as beef, mutton, fowl, etc. She should also make free use of acid drinks, as lemonade,

cider, tamarind water, etc. She should take moderate daily exercise in the open air, use a pleasant bath every day, and be regular in her meals and hours of repose. The bowels should be kept in a soluble condition by means of the bitartrate of potassa or the Seidlitz powder, and if the kidneys require medicine to keep them moderately active, nitrate of potassa may be given in doses of from five to ten grains, three times a day. She should under no circumstances whatever be subjected to venesection, for while that measure reduces the corpuscles, it favors an increase of fibrin in the blood, which is under such circumstances a scorbutic element; for if it is not employed promptly in nutrition it is very sure to deteriorate into an effete substance. My observation raises a strong presumption that in a large proportion of cases, predisposition to nurse's sore-mouth has its origin in the practice of bleeding pregnant women.

Where a female is suffering under the disease the same regimen should be prescribed as that just suggested for prevention, so far as justified by the state of the digestive organs. If the appetite is bad and the digestion feeble, medicines must be employed to improve the one and assist the other; and if, as is usual, the patient is anemic, chalybeates should be prescribed. Under such circumstances I have found the following an admirable prescription:

R. Comp. tinc. Cinchona, f3j.
Soluble Citrate of Iron, ʒj.
Lemon Sirup, f3j.

Mix. S. Take two teaspoonfuls three times a day before meals.

If the kidneys are torpid the nitrate of potassa should be given daily in moderate doses, and the bowels should be kept open by means of cremor tartar with sirup of senna, or some other aperient.

As a wash for the mouth the following has been my chief reliance:

R. Tinc. Hydrastis, f3ss.
Tinc. Myrrh, ʒā f3ij.
Saturated solution Chlorate of Potassa, f3ij.
Honey, f3j.

M. S. Wash the mouth and throat several times a day. S.]

of inflammation, increase the local difficulty, as well as debilitate the general system.

ANGINA, OR INFLAMMATION OF THE FAUCES.

We will next consider inflammation of the fauces, which occurs under various forms and with different degrees of intensity, all of which are embraced under the general term *Angina*, a word derived from the Greek, and signifying to *strangle*.

We might, perhaps, without much impropriety, comprehend in this class, a disease very closely allied to it by location and character, namely—tonsillitis, or inflammation of the tonsil glands; but this last-named disease has some peculiarities connected with its symptoms and treatment, which seem to entitle it to a distinct consideration.

The disease of which we are now to speak is usually called *sore-throat*, without swelling. There may be some swelling, it is true, but not so much as in *tonsillitis*. It usually comes on without any premonitory symptoms. The first thing to create suspicion is a slight soreness upon swallowing. This gradually increases until swallowing becomes painful and difficult. Upon examination, redness will be perceived in the whole surface of the fauces, involving the uvula, the velum pendulum, the lateral half arches, and surface of the tonsils.

This disease presents a considerable variety of appearances. In some cases the color is a bright red, in others a dark livid or purple. Each of these appearances will require different treatment. In some instances the uvula is very much inflamed and elongated. I have frequently seen it so much elongated as to touch and even lie upon the tongue, producing a constant tendency to swallow and an incessant hacking cough. At first there is a sensation of burning, or dryness at least in the fauces, which is soon followed by a profuse secretion of mucus, requiring to be constantly discharged. The dryness and soreness are increased during sleep. The inflammation is not always confined to the boundaries of the fauces, but frequently extends not only into the pharynx, but also into the larynx, trachea, bronchial tubes, and lungs. It is indeed no uncommon occurrence, that inflammation of the lungs proceeds from simple sore-throat; but where this is the case, it is accompanied by general disturbance, such as derangement of the glandular secretions, dryness of the skin,—in fact, all the ordinary symptoms of febrile reaction. This is especially the case in this country, and

here too, nothing is more common than for this fever to possess a periodical character.

Another peculiarity of this affection is its tendency to assume the character of chronic sore-throat; which when neglected is apt to extend to the larynx, producing what is popularly called bronchitis, but which should be called laryngitis. You will usually too, find the whole surface of the posterior part of the mouth, with the soft palate and uvula, involved in the chronic affection. In some cases, even where the inflammation has not extended to the larynx, the irritation, produced by the elongated uvula, keeps up a constant coughing, as if the disease had reached the lungs. I have seen cases where it was thought the patients were going into consumption, where this condition of the uvula was the only difficulty. This peculiarity is sometimes of great importance in forming a diagnosis.

This disease does however, often form the primary manifestation of a train of symptoms, which will progress from one degree of morbid action to another, if not arrested, and finally result in fatal disease of the lungs. Such is much more likely to be the tendency, where there is a scrofulous diathesis.

The most frequent *cause* of this disease is derangement of the stomach. Even where it appears to be produced by a slight exposure, careful examination will almost always trace it to gastric disorder as the proximate cause. In fact most of these local difficulties affecting the mouth, throat, etc., are connected with a deranged condition of the stomach. Where the affection becomes chronic it is apt to have connected with it the aphthous condition of which I have before treated. Angina may also result from local irritation, such as the action of acids or alkalies, or hot fluids, swallowed carelessly or by mistake; but as before stated, it most usually accompanies derangement of the stomach produced by cold.

In the *treatment* of this disease, as of others, the first thing to be taken into consideration is the cause that produced it. If the stomach be deranged, you must correct this condition; and perhaps there is no other disease to which emetics, have been applied so often without relief as the one now under consideration. This is because the present condition of the throat is not entirely dependent on gastric disorder, although that may have been the cause of it; but the inflammatory action having been established in the fauces, it may persist after the stomach has been relieved by an

emetic; and may indeed be aggravated for the time being by the irritating effect of the remedy. But though an emetic is not likely to produce immediate relief, it is generally useful in removing that obstacle to the cure, which must exist so long as the producing cause continues. But whether you administer an emetic or not, a hydragogue cathartic is decidedly indicated. It acts locally as well as generally, removing accumulations from the stomach and bowels, and at the same time exercising a beneficial influence on the general circulation. If there were not connected with the case, derangement of the stomach, I would not recommend an emetic, of course; but if one appeared to be indicated, I should give the lobelia and eupatorium. As a cathartic, our antibilious physic, given to the extent of producing free evacuations of the bowels, is well suited to most cases.

Where the inflammation is connected with cold, a thorough sweat should be induced either before or after the cathartic; and if the skin is dry, with considerable febrile reaction, the patient should be put to bed, and his throat steamed, which will generally be followed by immediate relief. The application of a hot fomentation to the throat is an excellent measure, allowing the patient at the same time to inhale the vapor of the fomentation; through the spout of a coffee-pot or tea-pot. If the case is very severe, involving the whole surface of the throat, local cupping under the angles of the jaws may be employed, often with marked success.

After a thorough evacuation of the bowels, they should be kept open by the use of gentle aperients. The Seidlitz powders is a pleasant drink, cooling and grateful, and, if given so as to produce a gentle cathartic effect, may be recommended as fulfilling all the indications of general treatment at this stage of the disorder.

You will observe that in this form of inflammation of the throat I have not mentioned gargles. I have omitted them for the very best of reasons, that I do not consider them beneficial in active inflammation. I have found them to aggravate the symptoms. But there is another form of sore-throat where the astringent and stimulating gargles are essentially important, that is, where the surface is more or less covered with cankers and where it presents a dark or purple appearance. They have the effect in such cases of throwing off the almost coagulated mucus which has collected, or the deadened epithelium that has formed. I have used in such cases a gargle formed by adding common salt to an infusion of cayenne pepper. In this case now, an emetic is of vast benefit;

ing generally followed by immediate relief, and by repeating the emetic a few times the relief will be permanent. The emetic before mentioned I prefer to almost any other.

I have met with angina complicated with periodic fever. Where this is the case the general principle which I have heretofore established should govern your action. The antiperiodic remedies should be introduced in connection with the treatment I have just been recommending. There is no necessity for delay in regard to either class of remedies; both may be given together. In doing this you tend to remove both difficulties at once. If the fever were the paramount difficulty, I should expect the local affection to disappear as it subsided, but generally you will find that this form of local disease is not entirely dependent on the fever. On the contrary, the local inflammation may have produced a sympathetic fever, which by depressing the vital energy of the system, has predisposed it to yield to the malarial influence, and thus the periodic character has been developed. In such cases the treatment should of course be directed to both causes, that is, the inflammatory and malarial; and in no case will the use of such combined measures be attended with disadvantage.

You will find in the authorities a thorough *bleeding* recommended for this simple form of inflammation, and it is certainly very remarkable that this heroic measure should be advised in this simple disease, thus inflicting an injury upon the constitution which may last for weeks, months, or years, for the purpose of relieving a local difficulty, which in a large number of cases, will pass off in a short time without any treatment at all. It appears so absurd that one would doubt whether any rational practitioner would adopt the treatment, however strongly recommended, yet I have so often known it to be done, that I can not but speak of it here, with a deprecating admonition.

Where this disease has assumed a *chronic* form, and become a mere local affection, you must rely mainly on local remedies. If the uvula is elongated, the application of a stimulating astringent, or of nitrate of silver will have a good effect. But you will find cases where these means will not be sufficient. In cases of such obstinate character I have sometimes been under the necessity of excising the ulva. This is done with the uvula scissors, and is a very simple and safe operation, unless by cutting too deep you produce hemorrhage by severing an artery, which is unnecessary and easily avoided.

In cases where the fauces and posterior wall of the pharynx present a granulated appearance, the application of a solution of nitrate of silver, say forty or fifty grains to the ounce of rain or distilled water, applied every other day with a probang will be found a very efficacious remedy.

When the disease has become chronic I have said your chief reliance will be in local remedies; but you should not depend on them alone. The condition of the stomach should be attended to. There is often a dyspeptic condition of the stomach with torpor of the bowels which should not be overlooked. You will often find also extreme emaciation and an anemic paleness in persons afflicted with inflammation of the fauces, in which case the anti-dyspeptic bitters is, according to my experience, of great service in regulating the bowels, promoting digestion and stimulating the secretions. This should be given to the extent of producing a free evacuation of the bowels every day, and with the local treatment is generally sufficient. But if there is a red tongue and irritable state of the stomach and bowels, it will not be proper to administer the bitters, even though there is general debility. In such cases a soothing tonic treatment is to be preferred, and I have found diluted ale, given in small quantities, a useful and unexceptionable remedy under such circumstances. It should not be given so freely as to produce its general stimulating influence, as that would aggravate the irritation. Connected with this, a general tonic, such as an infusion of the Ptetea, should be employed. Especial attention should be paid to the diet. A plain, simple and nutritious diet should be recommended, while all irritating and stimulating articles of food should be proscribed. Very little animal food is indigestible—it is more easily digested than vegetable,—but it is more stimulating, and on this account is objectionable in these cases. Rice, bread a day old, hominy, and similar articles, which can be obtained without difficulty, may be used. A little lean and tender mutton or chicken may be permitted, but all oily animal food and highly seasoned or rich pastries, hot bread or biscuit (which are not in fact suitable food for a healthy man) should be imperatively proscribed.

TONSILLITIS, OR INFLAMMATION OF THE TONSILS.

We will next take up the subject of Inflammation of the Amygdalæ or Tonsils. The most appropriate synonym of this inflammation is *Tonsillitis*; it has also been called *Cynanche Ton-*

sillaris, Angina Tonsillaris, Amygdalitis, and in common language, Quinsy.

The inflammation in this disease may be confined to one of the tonsil glands, during its whole progress, but most generally both glands finally become affected. In a large majority of cases, one gland is first affected, and after the inflammation has proceeded to resolution, it appears to be transferred to the other, though in some instances both glands are attacked simultaneously.

Although inflammation of the tonsils pre-supposes derangement of the general system, and especially of the stomach, yet the symptoms of such derangement are often so obscure at first, as scarcely to admonish the patient of any indisposition, until a slight soreness of the throat and difficulty of swallowing is recognized. At this stage of the disease, without careful examination it will be mistaken for angina or mere superficial inflammation; but by careful observation a marked difference will be perceived between the lastmentioned affection and tonsillitis, in which the substance of the gland is inflamed. It is true that in this disease the surface will present the flushed appearance, and most of the symptoms will coincide with those described in inflammation of the fauces, but in addition to these, tonsillitis will present diagnostic symptoms arising from the structure of the glands being involved.

The voice in tonsillitis will be sensibly changed to a nasal tone, while in angina it may not be affected at all. In the one case it exhibits palpable evidence of physical obstruction, while in the other, if altered at all, it is owing to the dryness of the air passages merely. The glands often swell enormously, and if both are involved they may touch each other, and occasion entire inability to swallow, and render it difficult if not impossible for the patient to speak. I have seen cases where a word could not be uttered by the patient. Liquids are as difficult to swallow as solid substances, because the stiffness of the fauces and swelling of the glands nearly or quite prevents the act of deglutition, by which food or drink is received into the pharynx and forced into the œsophagus. The swelling sometimes produces a sense of suffocation, which gives much alarm, and is hence an urgent symptom, although not likely to prove actually fatal. Yet it is not difficult to imagine a case in which death might occur in this way.

It is usual for contiguous parts to become involved in the inflammation. The uvula is often swelled, edematous in appearance and elongated so as to be in contact with the tongue, or lie upon one

of the tonsils. A very common symptom in the early stage, is more or less pain in the ear, owing to the connection existing between the throat and the ears through the medium of the eustachian tubes; and the obstruction of these tubes very often also, causes a partial loss of hearing for a time; or there may be merely a roaring in the ear on the side of the affected gland.

Accompanying these *local* symptoms will be usually more or less *constitutional derangement*. The tongue is uniformly found thickly coated, and with it an excited pulse is always present, and there is general disturbance of all the secretions. The urinary secretion is deranged, the skin is dry and the bowels torpid, in short, the palpable symptoms of febrile reaction are frequently associated with the local difficulty; though I have seen cases where the general system seemed to sympathize but very little.

Though fever is a usual symptom, it will most generally be sympathetic—a fever of irritation, such as often occurs in other inflammatory diseases; yet you may find sometimes the local disease preceded by fever, which fever may be the principal source of the difficulty. Hence the importance in all diseases, and especially in those of an inflammatory nature, of learning the minute history of the progress of the symptoms, in order to determine the causes that produced them. This fever connected with tonsillitis in this country, is generally of the periodic character, and I have seen the inflammation immediately subside on the arrest of the fever. A chill usually precedes the inflammation, attended with most of the other premonitory symptoms observed in the initiatory stage of ordinary bilious fever; such as pain in the back and limbs, indisposition to exercise, coated tongue, etc. In other cases however, as I remarked in the outset, little or no premonitory symptoms precede the attack, and very extensive inflammation is sometimes known to exist, without any important constitutional symptoms; the difficulty being merely local, depending on a slight cold, or derangement of the stomach.

This form of inflammation more frequently perhaps, than any other, *terminates* in abscess; fortunately abscess in this case is not so much to be dreaded as in some others; as patients often recover very rapidly after the discharge of the abscess, without any unpleasant consequences resulting from the diseased action. I have however, often seen it terminate in resolution. In some rare cases it terminates in sloughing. When this is the result you may see, by examining the tonsil, a gray spot which gradually extends

until the whole surface of the tonsil is occupied by it. It will present the appearance of a slough, which will finally come out leaving a deep ulcer. The ulcer will readily heal and the patient be relieved. Whether it terminate by sloughing or by abscess, as soon as the matter is discharged the patient rapidly recovers. I have seen cases of extensive abscess, where upon the discharge of the pus by bursting or by lancing, the patient was relieved in two minutes, and suffered little further inconvenience.

But it is a very common occurrence for the disease to take on a *chronic* character, which can scarcely be called inflammation, in which there seems to be an unnatural enlargement; and this scarcely ever changes without both general and local treatment, and sometimes the removal of the gland becomes necessary. Such is apt to be the case where the disease occurs in a person of the scrofulous diathesis. In fact scrofulous persons are much more liable to inflammation of the tonsils than any others, and it is thought by some to be a disease peculiar to persons of that habit.

The *prognosis* may be put down as decidedly favorable. I have never seen a case prove fatal from this disease itself, or from a disease reflected from or growing out of it. Yet it might reasonably be supposed that death could be produced by suffocation, caused by swelling of the glands and surrounding parts to such an extent as completely to obstruct the air-passages. In some cases the larynx becomes involved in the inflammation, and then it is much more urgent, and more to be dreaded; and it will of course require more prompt and efficient treatment. Where suffocation is imminently threatened, the only resort is to open the trachea and thus produce an artificial aperture for respiration until the inflammation can be subdued.

Tonsillitis is perhaps more frequently *caused* by a change of weather, than is any other form of inflammation. A person predisposed to the disease will be apt to take it by sitting where a draft of cool air passes through a window. I would rather have my whole person exposed to severely cold weather, than sit where a draft of air from a window would strike only a part of the body, and thereby disturb the equilibrium of temperature in the system. Hence persons predisposed to this affection should be forewarned not to expose themselves in this manner. Derangement of the stomach, and in fact any cause calculated to impair the health, may produce inflammation of the tonsils, where there is a predisposition to disease in these particular glands. The same thing is

true of all other diseases; where there is a peculiar liability to a disease, very slight changes in temperature, food, or other circumstances will often develop it, while other constitutions will withstand great exposure to morbid influences without being in the least affected.

We sometimes encounter this disease as an *epidemic*, more especially during the prevalence of scarlatina. It is indeed often complicated with scarlet fever, and forms one of the most troublesome symptoms connected with that disease. But independent of scarlet fever, at such a time you will hear most of the people in the neighborhood, perhaps, complaining more or less of sore-throat. Every disease that occurs during the prevalence of tonsillitis as an epidemic will be somewhat modified by it, and especially if it be a disease tending to affect the throat like scarlatina, the influence of tonsillitis will be the more aggravated.

In regard to *treatment*, I may remark that much traditionary, and I may add, visionary lore is to be found in the books and but very little information of real value. If you are called at a late period of its progress, you can hardly hope to arrest its course. It will very generally terminate in abscess; though the more mild cases will tend to resolution even without treatment, and in such cases this termination may be favored by judicious measures. But generally, I say, it will result in suppuration if not arrested in the early stage; and whatever measures you may employ, however active your depletion by the lancet or otherwise, you will under these circumstances be disappointed, if you expect by such means to arrest it. You may modify its violence perhaps, and give temporary ease to the patient, but you can not cut it short as you might have done in the early stage.

When you have an opportunity to treat a case of this disease in the early stage, you will obtain as far as practicable a general knowledge of the cause of the attack, and condition of the patient. In a large majority of cases you will find derangement of the stomach, and you should then administer an efficient emetic, and repeat it three or four times if necessary. In the early stage of the disease, before the inflammatory action has proceeded far, especially if there be not a strong predisposition to suppurative inflammation in these glands, it may be arrested at once, and I know of no measure more efficient for this purpose than an emetic. Following this should be given an active cathartic, for in connexion with derangement of the stomach, the bowels will contain vitiated

accumulations that should be removed. With these means, given with a view of arresting the disorder, you will find an excellent adjuvant in the application of a cup to the side of the throat; for you will readily perceive that the sudden abstraction of blood from the vessels in such close proximity to the inflamed part would tend to give present relief. I have seen this means followed, in many cases, by the most satisfactory results. This may be followed immediately by a soft, soothing poultice;—one of roasted onions is valuable in such cases, exerting its antispasmodic, with its emollient, relaxing influence. After the stomach and bowels have been evacuated, keep up a mild action of the bowels during the whole progress of the case. To fulfill this indication the Seidlitz powder is as good as any thing else; it carries off the watery portions of the blood, without diminishing its important vital elements, or interfering with its free circulation in the capillary vessels. This should be repeated often enough to produce two or three daily evacuations.

Where you find your patient restless and uneasy, an important means of relief for this irritability will be found in our common diaphoretic powder, taken every evening before going to bed. This article combines all the anodyne influence necessary for the purpose, with efficient diuretic and diaphoretic properties. It secures to the patient nights of quiet, comfortable rest, so very desirable in every disease, but especially where, as in the present case, there is much irritability and restlessness.

Another means that may be applied frequently, during the progress of tonsillitis, is the fomentation of bitter herbs, a very comforting prescription at any rate, if not positively curative. It seems to relax the parts, and produce a more copious secretion of mucus, and probably exerts some discutient influence. The patient may also derive benefit from inhaling the vapor of a decoction of bitter herbs, such as tansy, wormwood, motherwort, etc. This may be done three or four times daily.

I have rarely seen any benefit result from the use of gargles in this disease, except under peculiar circumstances. Where the tonsils are covered with canker, or where they are of a dark purple color, a stimulating gargle is certainly indicated; but gargles should not be used without discrimination as to the character of the affection. When there is a high state of inflammation, a stimulating gargle will be sure to protract the case, but where there is a want of activity in the part, as indicated by

the appearances just mentioned, a gargle of salt and pepper heretofore described will excite the capillary circulation in the surrounding parts to healthy action, and perhaps afford permanent relief to the patient; hence, as long as this inactive condition continues, the gargle should be repeated several times a day.

Where there is, attending the local affection, fever of a remittent character, the first object will be to overcome the febrile disease. The history of the case will determine whether or not the fever is the cause of the inflammation. If the fever preceded the inflammation, and present the periodic character, you should at once administer the antiperiodic remedies. I have seen many cases of inflammation of the tonsils promptly relieved by this treatment where it was associated with periodic fever. Or if the fever be continued without remission, but you have reason to believe it to have a malarial character, you will be perfectly safe in giving the quinia and iron, for they never aggravate any form of inflammation.

With the course of treatment now described you will be able, if called early, to arrest a large majority of cases. But if you are called after the disease has past the point at which it can be arrested, you will have to palliate the case as well as you can, keep up a free action of the bowels, and perhaps it may be necessary to administer an emetic. If in the progress of the disease you find ulceration to be inevitable, you must wait for this to occur. You can readily determine the existence of matter as in other cases by the fluctuation, or peculiarly soft, yielding, condition of the gland; and if there is an accumulation of pus, you may save your patient, perhaps, twenty-four hours of suffering by discharging it with a lancet or sharp-pointed bistoury; but in doing this you must carefully avoid wounding the mouth by passing the finger along with the instrument, or by muffling it to within a short distance of the point, and holding down the tongue with a scapula or spoon-handle. When the abscess is discharged the patient generally recovers immediately. I have however seen cases where the deep ulcer seemed to shoot out unhealthy granulations, which had to be touched with the nitrate of silver before cicatrization would occur.

You are aware that the authorities recommend in almost all cases of inflammation the free use of *calomel* and the *lancet*. These agents may in reality be said to constitute the sheet-anchor of the old-school segment of the medical profession. You know my

views, gentlemen, in regard to the use of the lancet in inflammatory disease. I have endeavored to lay down a plan of treatment, founded strictly on the laws of physiology, for the cure of inflammation, in general, and the principles I have endeavored to establish in reference to this subject, are perhaps as clearly elucidated in the management of tonsillitis, as of any other form of inflammation.

My former partner, Dr. D. Case, was subject to inflammation of the tonsils, and I treated him successfully a number of times, while he was a student, and suppuration occurred only once or twice. While he was at college, one of the professors told him that he could not only cure the disease, but prevent its recurrence. He submitted to the treatment proposed—was bled twice, cupped thoroughly, took calomel and antimony,—but onward marched the inflammation, in spite of all these means. Not only did the professor fail of preventing the case from running its full course, but he utterly failed, also, in protecting his patient from a recurrence of the disease, as he had promised. On the contrary, the disorder recurred more frequently, and more severely, and it was a number of years before he recovered from the injurious effects of the treatment,—being a person of scrofulous diathesis. He continued to have attacks of tonsillitis in much more frequent succession than formerly, going on uniformly to ulceration. I have seen a number of instances in which the evil effects of this plan of treatment were illustrated in a singular manner, irresistibly producing the conviction in my mind, that any attempt to reduce this form of inflammation by such measures must prove a failure.

I have already said that inflammation of these glands often degenerates into chronic enlargement, or what may be called an unnatural growth, with but little other symptoms of inflammation, and you will find cases of this description difficult to treat. You should not be too sanguine of success, or you may disappoint both yourself and your patient. In many cases it is utterly impossible to remove the difficulty, especially where there is a strong tendency to scrofulous disease. Yet I have, in many such cases occurring in children, succeeded in entirely removing the difficulty. The treatment in these cases must consist of a general course of constitutional treatment, adapted to change and remove the scrofulous diathesis, which will be fully presented when I come to speak of tuberculous disease.

ŒSOPHAGITIS: INFLAMMATION OF THE ŒSOPHAGUS.

I have seen but one case which could properly be called inflammation of the œsophagus, and it may be regarded as a very rare disease. I have often met with cases of irritation of this organ, but not of inflammation.

This disease may affect any portion of the tube,—the upper, middle, or lower; and it may involve either the mucous membrane alone, or extend to the sub-mucous cellular structure, and even to the muscular coat. The case to which I refer involved, finally, the whole tube, and terminated in gangrene. It was of a chronic character, and had existed a number of years. The individual had some years previously had an attack of scarlet fever, and the inflammation of the œsophagus was a sequel of that disorder.

The symptoms are, a sense of heat and pain, aggravated by swallowing either liquids or solids, especially the latter. The patient will point out the location of the disease by referring it to the region of the larynx, or lower in the throat, or perhaps to the back or lower part of the chest. In the case to which I have referred, the patient was able to tell the moment when any substance which was swallowed passed the location of the disease, until the entire tube became involved. If the inflammation is in the upper part, it may be easily recognized by pain on external pressure. Nausea and vomiting are early symptoms in its progress, and the matter discharged from the stomach is peculiar in appearance, having a clear mucous character; and what is remarkable, the tongue may not be coated, nor the appetite much impaired. Even to the last stage, food was relished as usual by the patient to whom I have referred, though this can not certainly be regarded as a type of active or acute œsophagitis. In the early stage there is but little fever, though as the disease progresses the febrile symptoms increase, accompanied by a general derangement of the secretions. The skin is dry, and fails to perform its functions. In the latter stage the vomiting will be of rather a shreddy character, instead of mucous, occasionally mixed with small dark specks.

It may be *caused* by mere local irritation, or extension of inflammation from contiguous parts,—as from the pharynx or larynx above, or from the stomach.

It is so very rare that but little can be said of its treatment. The general course of treatment for inflammation, already fully described, will suggest the proper mode of management for this

affection. The individual of whom I have spoken, was treated by a number of physicians, but with no benefit. If the inflammation is high in the œsophagus, the application of warm fomentations might be of service. I should not administer an emetic, for I should expect it would aggravate the symptoms. The administration of saline cathartics and cupping over the seat of the disease, are about all that can be done to advantage in this affection. Under certain circumstances it might be advisable to pass down a probang, for the purpose of applying a stimulating wash, such as a solution of nitrate of silver. The diet should be of the most simple farinaceous character.

LECTURE XXIII.

LOCAL DISEASES—CONTINUED.

Gastritis: Explanatory Remarks; Two Forms; Acute Gastritis, General Relations; Symptoms, Local—General—Favorable and Unfavorable; Symptoms of Disorganization; Duration; Modification; Pathological Relations; Redness of Mucous Membrane; Legal Investigations; Causes; Treatment.

GASTRITIS, OR INFLAMMATION OF THE STOMACH.

Explanatory Remarks.—The subject for consideration this morning is *Gastritis, or Inflammation of the Stomach*. Under this head I shall not consider that form of inflammation of the organ which has its principal seat in the peritoneal coat, as that will be comprehended hereafter in the consideration of peritoneal inflammation. The disease now to be described is located in the mucous membrane of the stomach; and yet is scarcely possible to conceive of inflammation as existing in this membrane, without involving to some extent the cellular tissue at least, if not the muscular and serous tissues of the organ. Indeed we do find in almost every case of active inflammation of the mucous surface of the stomach, that the disease extends to the submucous cellular tissue and sometimes even to the others also. Yet is by no means difficult to distinguish between the particular form of inflammation now before us, and that which is located specially in the serous coat, as will be abundantly shown before we shall have done with both subjects.

We shall consider gastritis under the two heads of *acute and chronic*. There is perhaps no organ in the body, which is more liable to the manifest varieties of inflammatory disease, as expressed by these two terms; and we shall therefore consider these varieties as distinct modifications of disease, manifesting considerable difference in symptoms and requiring different treatment. We shall then, first consider

ACUTE GASTRITIS.

General Relations.—This is seldom an entirely independent affection, though we meet with it so very frequently in the progress of other diseases, either growing out of them, or complicated with them, that it can not be set down as an unfrequent disease. It is one of the most common complications of bilious fever, very few serious cases of which occur in the Western or Southern country, wherein this is not a prominent attendant. So also of many other forms of disease, and especially the exanthematous varieties. There is for instance, no symptom more common during the progress of scarlatina, than active inflammation or a high grade of irritation of the stomach. So also of small-pox, and in fact of almost every variety of disease of the skin, owing to that kind of continuous sympathy which has to be taken into account in the explanation of many phenomena connected with morbid actions. From the fact that the mucous surfaces and the common integument are a continuation of the same tissues more or less modified, it is not surprising that a strong sympathy should exist between the external and internal surfaces of the body, and consequently that the stomach, especially, should be affected by diseases pertaining to the skin. In addition to this, the great range of sympathy existing between the stomach and other organs, must render it liable to be more or less affected by active disease, in whatever part of the body such disease may occur. Hence we find the stomach called into direct and active sympathy in diseases located very remotely from it. No matter where a disease exists, the intimate sympathy which the stomach holds with the most remote organs, renders it exceedingly obnoxious to the morbid influence. And this seems to be a very beneficent arrangement. The stomach, supplying the system, as it does, with all its materials for growth and reparation, if it were allowed to continue in a healthy condition, while disease was raging in the system, would be constantly adding fuel to the fire; but the sympathetic relation of which we have spoken, suspending the function of the stomach, prevents the process of digestion from promoting the activity of disease.

The *symptoms* attendant upon acute inflammation of the stomach are very plain and easily recognized. Almost the first symptoms of which the patient complains are a burning sensation at the pit of the stomach, nausea, very generally, vomiting, and pain, when pressure is made upon the epigastrium. The pain and soreness are

also manifestly increased by vomiting, not unfrequently producing spasm of the muscular coat of the stomach, which constitutes a most distressing symptom.

The *contents* of the *stomach*, if ejected after a full meal, may be partially digested, presenting the appearance of chyme, mixed generally with more or less mucus, and in some instances streaked with blood, in the early stage.

Accompanying this irritated condition of the stomach are frequent *spasms* of the *œsophagus*, causing difficulty in swallowing; and this is quite a prominent symptom. This tube may not be involved in the inflammation, but the spasmodic action is derived from nervous sympathy with the stomach. I have seen cases where it was almost impossible for the patient to swallow at all.

Intense *thirst* is another very prominent symptom and rarely absent. The patient will feel an incessant demand for cold drinks; and this thirst will be very difficult to relieve; a full draught of cold water scarcely remains long enough on the stomach to become warm, and there is an immediate demand for more. The only way in which the thirst can be satisfied, is by administering water in very small doses—a teaspoonful, at most, at a time—and this should be borne in mind. This symptom exists throughout the progress of the disease.

In addition to these *local* symptoms, we have many others of a more *general* character, but perhaps not less specific or peculiar. The *pulse* is very strikingly affected in gastritis, differing in many respects from its character in most other inflammatory diseases. While in other disorders of an inflammatory nature you generally have a full bounding pulse, in this it is small, hard and depressed. Accompanying this symptom, there is generally an intense heat of the skin on the body, while the extremities are inclined to be cold, though in some stages the whole surface will be cool, but very dry and husky. In the early stage the skin is usually very dry and parched, and it is with great difficulty that any degree of relaxation is produced.

The *tongue* has a peculiar appearance, as you will readily suppose. In the early stage it is usually a little coated in the middle, while the edges are fiery red. That the coat is very thin is shown by the papillæ rising above it. But as the disease progresses this coat gradually disappears, and the whole surface of the tongue and lips presents a red, irritated appearance, such as we observe in pro-

tracted cases of disease of the lungs, and often in scarlatina and other exanthematous disorders.

The *bowels*, where inflammation does not extend to them, are exceedingly torpid; but where the inflammation extends to the bowels, which is apt to be the case in the later stages, if the disease be protracted, diarrhea is an attendant symptom. In this case the patient lies upon his back with his feet drawn up, so as to relieve the tension of the abdomen.

Another prominent symptom is the peculiar *restlessness* of the patient, with the great depression of spirits which characterizes gastritis, showing most clearly the general sympathy between the stomach and every other organ in the system.

Respiration is materially affected in the progress of this disorder, being generally frequent, irregular and sighing. A troublesome hacking *cough* is a very common symptom. Whether this results from nausea and the constant tendency to vomit, or from direct sympathetic influence of the disease upon the lungs, is not clearly decided, yet you rarely ever find a case of acute inflammation of the stomach without this cough.

If there is a tendency to a *favorable* change, we will find a gradual amelioration of all these symptoms and a tendency of the stomach to return to its natural functions. If on the other hand the tendency is from *bad to worse*, we find a corresponding aggravation of all the symptoms attendant upon the case. The skin becomes cool, though exceedingly dry and hard, the urine becomes more scanty, if not suppressed; the pulse becomes more rapid and thread-like under the finger, the respiration more hurried and irregular, the cough more troublesome, while the active vomiting and retching which accompany the early stage, give place to a kind of regurgitation, apparently without nausea, by which the contents of the stomach are thrown off without any apparent effort: this is a very alarming and formidable symptom. The matter ejected from the stomach is strikingly peculiar. Instead of the chyme and mucous ejections streaked with blood seen in the early stage, there is now thrown up a dark semi-bloody, grainy substance, very similar to the black vomit of yellow fever; being undoubtedly, blood in a partially decomposed condition. Or if the ejections have not this character, they consist of mucus containing *dark flocculi*, being probably, portions of the mucous membrane, softened and detached. The countenance becomes sunken, haggard and deathlike, and presents every appearance of speedy dissolution.

When the stomach has been actually *disorganized* by the action of corrosive poisons, the countenance is pale and sunken from the beginning; those symptoms of reaction described in the first stages never occur, but the patient sinks at once into the condition marking the last stage of inflammation of the stomach, and often dies within from twelve to twenty-four hours, according to the amount of disorganization produced. The disorganization in such cases, is not confined to the mucous coat, but extends to the cellular, muscular, and often to the serous tissue of the organ.

The duration of gastritis is quite variable, depending on the cause that produced it, and on the peculiarities of the constitution affected. It is however liable to be protracted, when not produced by local irritants or poisons. Coming on gradually, as it frequently does, it is very likely to be protracted and tedious. But where active inflammation, without disorganization, is produced by a local irritant; upon the removal of the cause, and under a mild, soothing treatment, the patient soon recovers. Indeed the rapidity with which recovery takes place, after the progress of morbid action has been arrested, is strikingly peculiar; and this will be observed, whether the inflammation is produced by direct local irritation, or arises in the progress of some other disease. As soon as the active inflammation is subdued, the stomach begins to perform its natural functions of digestion, and the patient often rapidly recovers, notwithstanding there may have been great prostration of the vital powers.

You will not find every case presenting precisely the symptoms I have described. Of course, cases of a milder character would develop symptoms less formidable and severe, and it is unnecessary to dwell at length on the various modifications. I have given you merely the more prominent and diagnostic phenomena usually to be met with in this disease, and upon which you may rely in forming an opinion. All we can do in describing diseases, is to pursue a kind of middle path as regards the symptoms, and leave the student to exercise his judgment in recognizing the modifications of these symptoms, which he must always expect to encounter in actual practice.

The *pathological* relations of this disease are of considerable importance, and I should be glad to dwell upon them more at length than present circumstances will permit. You will readily see the importance of a correct acquaintance with the anatomical characters of this affection, when you reflect that occasions may

arise, when upon your decision as a medical man, may depend the liberty, perhaps the lives of some of your fellow-beings. I trust therefore that you will seek diligently to attain a thorough acquaintance with the pathological character of this disease, so important in toxicological investigations, and a knowledge of which will aid you much in the application of a rational course of treatment.

Whatever the cause of the inflammation may be,—but more especially if produced in the ordinary way, as by fever, indigestible and irritating matters in the stomach, or intemperate drinking,—the stomach is usually very much contracted. And you will find this peculiarity important in discriminating between inflammation produced by an active poison, and that which is the result of protracted diseased action. In cases of the latter description the stomach is contracted, often almost to the size of the duodenum; while in the former it is but little changed in size.

The mucous membrane is red in places and exceedingly rough and corrugated, and the whole surface is usually covered with a peculiar mucus-like substance of a friable and viscid nature, easily rubbed off with the handle of a scalpel; and upon removing this coat, the true condition of the mucous membrane may be readily recognized. In health the surface is usually covered with mucus, but it has not this viscid, partially purulent appearance.

If the disease has not progressed to the extent of producing disorganization—as it will not in most cases, if the cause is promptly removed—the mucous membrane of the stomach has a reddened appearance, in some instances extending over the whole surface, but most generally in patches, exhibiting a radiated arrangement, like certain kinds of crystallization; which is owing to the great engorgement of some of the vessels while others are empty. This color however, varies exceedingly according to the intensity of the inflammation. In some cases it is red, in others a dark purple. In a majority of cases post-mortem examination will reveal more or less disorganization—in some cases actual ulceration in patches—and the mucous coat so softened as to be easily picked to pieces with the fingers. The submucous cellular tissue is often in the same condition, and I have seen cases where the muscular coat could be picked to pieces like brown paper; but this is rare, unless produced by local poison.

It is important that you should be able to distinguish between the *redness* of mucous membranes caused by inflammation, and

that appertaining to other conditions. It has been found, for instance, by ocular demonstration, in perhaps the only case of the kind that ever occurred, that during the process of digestion in health, the mucous coat presents a positively reddened appearance. The subject upon whom this, with various other observations was made, was a man by the name of St. Martin, who had a wound in his stomach through which the whole process of digestion could be seen. These observations were made by Dr. Beaumont, during a series of months, and under a great variety of circumstances. It was found that during the process of digestion the mucous coat of the stomach presented a rose-colored appearance, but more especially when stimulating drinks were taken with the food. It should also be borne in mind that the stomachs of children in health always have this rose-colored flush.

These facts should be retained in the memory, as they are important in *legal investigations* in reference to the cause of death. Mere redness is not a sufficient ground for the opinion that inflammation has certainly existed in the case. In forming an opinion, under such circumstances, you should take into consideration the history of the case; the mode of death—whether sudden, or otherwise; the character of the individual; the contents of the stomach and bowels as indicating the state of the digestive functions, etc. Without this care and precaution, you might be led to express an opinion entirely erroneous, and upon which serious consequences to others might depend; and I need hardly add that such a mistake, afterward discovered, would be a source of severe and lasting uneasiness, to say the least, in the mind of the conscientious and sensitive physician.

The *causes* of inflammation of the stomach you have probably already anticipated. I will however say, that irritating substances taken into the stomach are by far the most frequent causes of gastritis, where it occurs as an independent affection. Highly seasoned and stimulating food is frequently the cause of inflammation of the stomach, where there is a predisposition to the disease; and although the more corrosive and irritating the substance swallowed, the more certain it is to light up inflammatory action; yet apparently trifling causes sometimes appear to produce it under certain circumstances. A very important fact in this connection, and one which should not be lost sight of in practice, is that there exists in many families an evident hereditary predisposition to this form of disease. Where you find the father and mother exceed-

ingly obnoxious to disorder of this organ, you will generally find the same tendency in the children. I have in my mind now, quite a number of families of this description. If you are called upon to practice in such families, your success will in a great measure depend on your acquaintance with their diathesis and idiosyncrasies. While in some families you may safely administer active purgatives in the treatment of various forms of disease, you could not employ them in families having a strong predisposition to irritation of the stomach, except at the risk of producing inflammation of that organ.

Inflammation of the stomach has been produced by an overdraught of cold water, taken when the system was highly excited by exercise, or heated by exposure to the direct rays of the sun.

It is also sometimes produced by the translation of other disease, as rheumatism, gout, and cutaneous eruptions. We often see children that have been thrown into spasms by the sudden retrocession of eruptions on the skin, associated with irritation, involving the mucous surface of the stomach. Facts of this kind are too important to be overlooked in treatment.

In the *treatment* of gastritis, as in all other diseases, the paramount consideration is the cause; for upon this your course of measures will greatly depend. If you have a case of inflammation of the stomach caused by an acrid poison taken into it, your first effort should be to evacuate the stomach and wash it out. Of course, then, the first remedy to be given is an emetic, and the choice of an agent for this purpose is of great importance. It should be one that will operate quickly and thoroughly; completely evacuating the stomach, and producing as little irritation as possible. To fulfill this indication with efficiency, I know of no article in the whole range of remedies of this class, preferable to the infusion of lobelia and eupatorium, or the tincture of lobelia in an infusion of the boneset. In nineteen cases out of twenty the first dose will not lie on the stomach five minutes. The dose should be large, so as to secure a quick and complete evacuation. The first dose should be administered with but little fluid. But after evacuating the stomach of its contents, I wish you to bear it in mind, gentlemen, you must proceed further, and by the use of fluids wash out all the remaining poison, which may have become involved in the villous surface of the stomach and thus retained. Therefore, after having secured a full and free emesis by your first prescription, fill the stomach with a warm fluid, for which purpose

the boneset infusion is well adapted, as it possesses emetic properties itself in large doses, and essentially aids the action of the lobelia, while it answers the purpose of a wash as well as any thing else. In the absence of lobelia an infusion of ipecacuanha may be employed. [My experience favors the combination of these two agents where an unirritating yet thorough emetic is indicated. S.]

This indication being fulfilled, you have a simple case of gastritis to treat, and if the action of the poison has not produced positive disorganization, the symptoms will usually subside in a short time. On the other hand, if disorganization has taken place, you have a more aggravated case, which must be managed by prompt but mild measures. The bowels should be evacuated by enemata, as cathartics by way of the stomach are inadmissible,—first, because they would aggravate the inflammation, and secondly, because they would not be retained. I am accustomed, in such cases, to administer by injection a decoction of our antibilious physic, or castor oil, or molasses and warm water, advising the patient to retain it as long as practicable. If this does not operate in two hours, I give a second portion and allow it to come away immediately. The clyster should be thrown well up into the colon; hence, a pump is better than a syringe, if convenient. This will usually produce free evacuation of the bowels. Conjointly with the measures I have recommended, counter-irritation should be employed over the stomach; even cupping might be of service, though I have found less benefit resulting from the use of cups over the stomach, than on any other part of the body. The imperfect supply, both of the capillary vessels and nervous sensibility, to the surface in the epigastrium, renders it difficult to produce much effect, especially with ordinary cupping-glasses, and if this measure is employed, a large tumbler should be used for the purpose. I have sometimes produced very marked results by the use of a glass large enough to cover a considerable portion of the epigastric region. Extreme irritability of the stomach may be relieved by very small portions of morphia; just enough to act as a mild local sedative. The doses may be from one twentieth to one sixteenth of a grain, and given every two hours until the desired effect is produced. Very small quantities of any kind of fluids should be allowed. In giving the patient drink, only a teaspoonful should be given at a time, and then you should wait for that to be absorbed before any more is given, for a larger quantity will most certainly be rejected by the stomach, and the act of

vomiting will aggravate the irritation and consequently increase the thirst. But by administering water in very small quantities, a much larger amount can be introduced into the system within a given time, than could possibly be done in large portions.

If you learn from the history of the case that it has resulted from taking cold water, while the system was over-heated, you will rely much upon counter-irritation over the stomach. If you should give an emetic in this case, as was directed in the one last mentioned, you would most certainly and seriously aggravate the inflammation. Sinapisms or cups should be applied to the epigastric region, and followed by hot fomentations, or what, in my experience often answers a most admirable purpose, the application of a towel wet in cold water, to the same part. Cool and soothing drink should be given. A cold infusion of the *althea officinalis* (or marsh mallows), slippery elm, or flax-seed, is suitable for this purpose, while the use of stimulating injections will serve to keep up a due activity of the bowels, and act in some measure revulsively on the inflamed stomach. In this case too, if there is much irritability, small doses of morphine will be advantageous in soothing the stomach and arresting the vomiting.

If the disease has been produced by the excessive use of alcoholic stimulants, as you will often find to be the case in the early stage of delirium tremens, all that can be done is to withhold those stimulants, apply moderate counter-irritation, and secure rest to the patient by very small doses of morphine, or better, dilute prussic acid.

If the disease result from rheumatism, in addition to the soothing internal treatment already recommended, extensive counter-irritation to the spine, and such other local measures as will be hereafter directed for the cure of rheumatic disorders, will be required.

[I have found the tincture of aconite root in doses of three drops given in a teaspoonful of ice-water every four hours, and trisnitrate of bismuth in doses of five grains every four hours, alternating with the aconite, very useful in alleviating distress and diminishing gastric inflammation. An infusion of Solomon's-seal made very cold with ice, is useful as a drink. 8.]

LECTURE XXIV.

LOCAL DISEASES—CONTINUED.

Chronic Gastritis: Preliminary Remarks; Distinguished from Dyspepsia; Symptoms; Duration; Causes; Treatment—If caused by Over-eating, etc.—If caused by Spirituous Liquors; Active Purgatives to be Avoided. Dyspepsia or Indigestion: Digestive Function considered; Effects of Fluids; Symptoms of Hepatic Disorder; Influence of Irregular Habits; Want of Exercise, etc.

CHRONIC GASTRITIS, OR CHRONIC INFLAMMATION OF THE STOMACH.

This is a disease of very frequent occurrence. I do not think however, that the phenomena which characterize what is usually called chronic inflammation of the stomach, denote a condition which can, strictly speaking, be called inflammation; though the appearances on post-mortem examination do indicate the results of morbid action, justifying, perhaps, the use of this term. I prefer however to call it irritation; and think this word more truly expressive of the real nature of the difficulty. It is a condition of the mucous surface holding a position midway between active inflammation and a state of health. I think the circumstances attendant upon it, and the symptoms that it develops, clearly justify this conclusion; but you will find it treated of in the authorities as chronic inflammation, and for convenience sake I retain the term, using it however in this relation as synonymous with irritation.

This affection is manifested by a number of very prominent symptoms, and is attended by a form of indigestion which is frequently called dyspepsia, and may in fact be considered a variety of dyspepsia, though it does not present a condition of the stomach usually embraced under that term. I shall speak of indigestion proper, hereafter, during this lecture, and will now consider that form of disease which is dependent on irritation. This form of indigestion is a very common condition, and one of which you will frequently be called to prescribe under the name of indigestion or

dyspepsia. And if you do not recognize the real condition of the stomach you will be liable to be misled in your treatment. If you rely upon the name merely, as is too often the case, and undertake to administer tonics and stimulants, as in ordinary forms of dyspepsia, you will be almost certain to aggravate every symptom, and do the patient serious injury.

We have then this morning to consider the *phenomena* of indigestion connected with irritation, or what is commonly called chronic inflammation of the stomach. It will be distinctly manifested by some three or four peculiar symptoms which are clearly diagnostic. The appearance of the tongue is an almost certain guide. It is nearly always tipped on the edges with a deep red color; in other cases the whole surface will show a very peculiar appearance—in most instances, high colored, smooth and glossy; though sometimes but little changed in color, and rarely ever coated. But the red appearance does not always imply irritation of the stomach, unless there are other symptoms present. When you observe this condition of the tongue with a small and somewhat excited pulse—though not so rapid as in the acute inflammation, yet, upon careful investigation, evidently somewhat excited, ranging perhaps from 80 to 100 per minute—with a small, wiry feel; and when in addition to these two symptoms, you find the local evidence of gastric irritation, such as constant uneasiness and tenderness upon pressure in the epigastrium, you have the essential characteristics of this disease. When these symptoms are clearly developed you need scarcely look further. This uneasiness of the stomach will be essentially aggravated after eating—especially after a full meal. Unlike any other form of dyspepsia, eating does not give temporary relief. The pain may be confined to the stomach, or shoot from one side to the other, ascending into the lungs and sometimes to the œsophagus, and produce a spasmodic and choking sensation.

The bowels, if the inflammation is confined to the stomach, are usually costive; but in a large majority of cases the irritation, if serious and protracted, is extended to the mucous surface of the bowels and diarrhea is the consequence. The skin, though not hot, has a peculiar rough, dry, and husky character. I have seen it exhibiting a kind of scaly and parched appearance. The urine is exceedingly variable in quantity, being sometimes scanty and at others quite free and copious, is usually high-colored, and upon standing will deposit a sediment. You will not find this to be the

case in any active inflammatory disease. It is a peculiar symptom of active inflammation, that during its progress the urine never deposits a sediment, though such deposit is almost always an attendant upon its decline. The appetite and thirst in chronic gastritis are exceedingly variable. In a majority of cases there is great demand for drink; and the appetite is sometimes voracious, while in other cases it is entirely absent. The patient will sit down to a meal with an apparent demand for food, but on eating a mouthful or two it becomes offensive and produces nausea. Headache will usually follow a meal, especially a full one, and this is almost invariably accompanied with an increase of tenderness in the epigastrium.

A sensation is frequently experienced which is mistaken for hunger, and the patient will partake, to his great inconvenience, of a considerable quantity of food out of his regular hours for eating. This should be carefully avoided. In some cases there is an entire loss of appetite with a disagreeable taste in the mouth, especially in the morning. In others there will be excessive accumulation of gas in the stomach, from the partial fermentation or decomposition of the food. This gas varies greatly in its character, in some instances being not unusually offensive, but in others exceedingly so. In other cases nausea immediately follows eating, and the patient leaves the table to throw up what he has taken.

These are the general leading symptoms of chronic inflammation of the stomach, or what I consider merely a form of indigestion dependent on irritation. It is exceedingly variable in its *duration*. It often supervenes on attacks of fever, especially of typhoid, where the individual upon getting up eats too much, and his already debilitated stomach becomes the seat of irritation. It sometimes lasts for years and not unfrequently lays the foundation for more formidable diseases. I have seen many cases of phthisis pulmonalis resulting from this disease. Hence the great importance of being careful, after the occurrence of fevers and other forms of disease developing or associated with this condition of the stomach, not to indulge too much in eating or other irregularities. There is no doubt that this form of inflammation frequently terminates in ulceration; in fact many cases of this kind have occurred. It may also result in softening and gangrene.

There is but one form of disease with which it is liable to be confounded, but if you are careful in observing the particular symptoms you will not be misled. It may be confounded with

gastralgia. But in this disease there is no tenderness of the epigastrium, no unusual appearance of the tongue, nor excitement of the pulse. The anatomical developments of this form of disease are not very materially different from those of acute gastritis, except that the redness is of a much lighter color, and the other evidences of disease are not generally so striking nor extensive as in the acute form.

In regard to the *causes*, you have perhaps already anticipated me. It most commonly results from particular cases of fever badly treated; or from constitutional predisposition and indiscretion in eating and drinking. It is a very common attendant upon habits of intemperance.

Another very common cause is the long-continued use of active drastic purgatives. And this is an important idea that should not be lost sight of in the treatment. It is often an attendant upon the last stage of consumption, frequently in fact, a symptom throughout the whole progress of that disease, and not unfrequently the essential cause in the production of pulmonary disease. In some instances I have known it to follow scarlet fever, and sometimes small-pox. This arises from imprudence, and with proper care may be avoided in these diseases, and also in typhoid and congestive fever.

There is another circumstance that should not be overlooked in the investigation of these cases. I refer to the peculiar predisposition in individuals and families. Where this is found to be the case, more strict care in diet and habits is necessary.

With a view to the correct *treatment* of chronic inflammation, the cause should first be ascertained. If it has been the result of indiscretion in eating and drinking, the regulation of these habits, if it does not effect the cure of itself, will essentially hasten the progress of recovery. And without this you may as well expect to extinguish fire by adding fuel. Attention to diet is of paramount consideration. The food should be of the mildest and most unirritating kind, while you should carefully avoid all active medication. Slight counter-irritation of the stomach and the simplest kind of tonics may be resorted to. I have been in the habit of giving, under such circumstances, a decoction or infusion of the ptelea, which may be relied on as a tonic—that will not aggravate the symptoms. These means, with as much *exercise* as is compatible with the circumstances of the case, will usually be sufficient. If the bowels are costive, and the proper regimen fails to bring about

a healthy action, gentle lavements should be resorted to. Regularity in this respect should by all means be secured; and if it can not be done otherwise, the enemata should be given at certain hours; and in this manner regularity will be induced. There is perhaps no other disease in which regularity and order are more important than in diseases of the stomach, owing to the intimate sympathy existing between the stomach and every other organ of the body.

I might perhaps particularize with advantage, the kinds of *food* most suitable under these circumstances. Rice, cream-toast, made of stale bread, with little if any butter, and weak tea, are allowable, but until the irritation has in a good measure receded, no kind of animal food should be allowed, and spirits of every description, even ale and the weak wines, should be strictly forbidden. But when the more urgent symptoms of the irritation have subsided, you may gradually introduce more substantial and stimulating diet. Extreme circumspection is necessary in diet, for the least change would be sensibly felt by the stomach. When it is thought advisable to allow meat, attention should be paid to the kind used. Rarely-cooked beef is perhaps the most easy of digestion. I have learned from long experience that over-cooked meats of any kind are less easy of digestion than if rarely done. Beef is perhaps the most digestible meat, but venison and birds are nearly equally so. Pork, and fat greasy food of every description, should be proscribed. Veal is not so easy of digestion as beef. A small amount of mutton may be used when the patient is fond of it. I have found another article of animal diet very easily digested; I mean codfish. After the irritation of the stomach is subdued, this article, eaten with a roasted mealy potato, will be very acceptable to the stomach. I have often seen patients bear this before they could eat any other kind of animal food, and it is very nutritious.

In those cases brought about by the long-continued use of *spirituous liquors* you will not find precisely the same course applicable. You will find it necessary in this case to resort to mild stimulants. Complete abstinence from their use after employing them for a long time, would produce unpleasant results. Instead of the more stimulating liquors you should recommend ale, and perhaps some of the weaker wines, two or three times a day. With these, use counter-irritation and mild tonics. I do not desire to be understood, however, as recommending the prescription of alcoholic drinks for persons of intemperate habits, and who are making an

effort to reform. Such persons should be prevented if possible from tasting spirits, even at the risk of incurring an attack of the mania & potu. Should symptoms of this affection ensue, such treatment should be employed as will be directed under that head.

You will find some persons very fond of milk. And though this is an article which will not ordinarily be borne in these cases, there are certain constitutions with which it will agree, even in this disease; and these peculiarities should always be taken into consideration.

But above all, abstain from *active purgatives* of every description, and if the bowels can not be moved by proper regimen and injections, then the simplest aperients should alone be resorted to; bearing in mind that you have an extremely irritated surface with which your medicine must come in contact, and that purgatives tend to aggravate this irritation, and should only be administered where the disturbance of the system would be greater without them—which is very rare. But you may rely upon it, as long as you administer active purges and stimulants your patients will not recover; although they may be temporarily relieved, the disease will be more firmly fixed, and is sure to be more protracted. If, from the evacuations and symptoms present, you discover that there is an increase in the irritation of the stomach, during the application of more corroborative measures, a slight change of treatment will be necessary.

Under such circumstances tea of *hydrastis canadensis* and a return to the more simple and mild articles of diet will be necessary. I have seen patients recover under this course that had lingered for a long time under other treatment. Another very useful remedy in some cases is small portions of the nitrate of silver, administered with great caution, and not repeated often. It may be given in doses of from one-twentieth to the sixteenth of a grain, and repeated once in eight hours for a day or two, when it should be suspended. The crystallized nitrate of silver may be surrounded with gum opium, when the disease is associated with a mucous diarrhea, or when the opium is objectionable or unnecessary it may be made into a pill with gum Arabic. In this manner it will excite healthy action in the ulcerated and abraded mucous tissues, and often be followed by healthy bilious evacuations. Where it is connected with irritation of the bowels and diarrhea, but not of a mucous character, with less of general irritation, the

compound powder of rhubarb* is the most reliable remedy, and one less likely to disappoint your expectations than any prescription I have ever used. This may be given, not as a purgative, but with a view to correct the acidity of the alimentary canal, gradually restrain the too frequent discharges, and give tone to the relaxed mucous membrane.

DYSPEPSIA OR INDIGESTION.

We come now to speak of *indigestion proper*. This form of indigestion is entirely different from that which I have just considered. It may be dependent upon mere torpor of the stomach, either of the muscular coat, mucous membrane, or gastric follicles. When the mucous coat is torpid it may fail to secrete the proper amount of gastric fluid, so essential to digestion, and slow or imperfect digestion will be the result. This constitutes one form of indigestion; so when there is positive debility of the muscular coat, that contraction of the stomach so important in every stage of digestion is wanting, and *dyspepsia* or *indigestion* is the inevitable consequence.

For the purpose of better appreciating the phenomena of indigestion, it will be profitable for us to inquire into, or understand in what the process of digestion consists, and what are the well-defined attendant phenomena that follow after mastication, and after the food is taken into the stomach. If liquids are taken with the food, it will remain unchanged until the fluid portion is absorbed. We find a peculiar set of vessels in the stomach, which are found in the system no where else, consisting of open-mouthed veins, which, by a kind of suction, or to speak more scientifically, by absorption, take up the fluid. When the fluid is all absorbed by these vessels, the muscular coat of the stomach contracts upon its solid contents, and digestion may then be said to be properly commenced. I do not use the word *solid* in its usual signification, that is, I do not mean that the food becomes as solid as a piece of marble, but that it acquires a considerable degree of consistency before the muscular action of the stomach is exerted upon it. After the muscular coat contracts, and the mucous and villous coat

- * **R** Rhubarb pulv. (Turk.)
- Bicarb. potass.
- Mentha piperito.
- Cinnamon bark pulv. āā 3ij.
- Water, boiling, Oi.
- Infuse, strain, and add sugar q. s.

touches the mass of food and presses upon it at every point, the gastric juice is given out, and then the process of digestion is fully under way. The gastric juice spreads over the solid contents of the stomach and softens the surface of the whole mass. The surface is then rubbed off by attrition of the villi of the mucous membrane, produced by the constantly-recurring contraction of the variously-arranged fibers of the muscular coat of the stomach, and when thus rubbed off is passed onward to the pylorus. From thence it is taken into the duodenum and mixed with the secretion from the liver.

Another portion of gastric juice is then secreted and performs its work of softening as before, and another portion of the food is rubbed off by the villous surface and passes into the duodenum; and thus the process goes on until the contents are *digested*.

Fluids, taken into the stomach, during the process of digestion, suspend this process until the fluid is absorbed. This should be borne in mind in the treatment of dyspeptics. They should have their regular drinks as well as regular meals, and take neither out of the proper time. You can readily see how debility of any of the coats of the stomach may be connected with indigestion, and you can also appreciate the modifying influence of both the quantity and the quality of food.

It follows conclusively from these considerations that the suspension of action either in the muscular coat, or the mucous membrane and gastric follicles, must of necessity interrupt more or less the process of digestion, and should be avoided.

Indigestion may also be dependent upon torpor of the liver or excessive action of that organ. In that case the stomach is not usually or necessarily involved to any great extent. Where it depends on the *liver*, the character of the evacuations will be the main circumstance that will enable you to recognize it. The liver may however perform its functions naturally and properly, while indigestion may exist, dependent on mere atony of the organs concerned in the first process of digestion. This condition of the stomach will be accompanied by some symptoms of a peculiar character. I may remark here, however, that the absence of those symptoms common to inflammation of the stomach will be your main guide in determining the proposition. In other words, if you find a patient laboring under indigestion, whose food produces distress a few hours after it has been taken, who regurgitates his food with or without nausea—whether he had an appetite before eating

or not—whose food passes off undigested, and who does not exhibit those symptoms of excitement described as characterizing chronic inflammation, you may look upon it as a case of dyspepsia depending on debility of the stomach and not on irritation. Persons with this form of indigestion are apt to have restless nights and unpleasant dreams. Another peculiar symptom in this form of indigestion will be the entire relief from all uneasiness immediately after eating. Eating seems to satisfy the demand for food, and is not immediately followed by those distressing symptoms which invariably accompany the early stage of the digestive process, when there is an irritable condition of the stomach. This fact is peculiarly diagnostic. A great variety of sympathetic symptoms will be found to accompany this form of disease, upon which it is unnecessary to dwell at length. Palpitation of the heart is often an attendant symptom, and subsides when the tone of the digestive organs is restored. The tongue in most cases is furred, especially in the morning, and the coat will sometimes pass off toward evening, and leave the tongue clean and without any unusual redness. More or less debility too is a general attendant upon indigestion. The capillary circulation is generally imperfect, and the extremities usually cold upon the least exposure. In some cases the individual seems to retain his ordinary amount of flesh, but in most cases the disease is attended by emaciation.

The most common causes of this form of indigestion is *irregularity of habits* associated with want of exercise. Individuals of sedentary habits are most liable to it. The stomach seems to regulate its action by the activity of the other organs of the body. When the individual is confined and takes little exercise, the muscles being but slightly employed, nutrition is imperfectly accomplished, and the stomach will also assume an inactive character. Exercise is almost as necessary to good health as the food we take, and it is the only method in fact by which the old, effete matter can be eliminated from the system, and new materials taken in its place. As a general rule the muscular vigor and power will be in proportion to the exercise taken. This is true of the muscular system in general and of each individual muscle separately.

No muscle can continue habitually inactive without becoming more or less debilitated, and without in a degree impairing the tone of the stomach. In other words, the full energy of the digestive functions can not be sustained without such exercise as shall

require moderate action in all the muscles of the body. Hence, the muscular coat of the stomach is usually, in persons of sedentary habits, debilitated. This fact should by all means be taken into account, in regulating the dietetic habits of individuals. There should in all cases be observed a proportion between the receipts and expenditures of the system. Persons with but little exercise should take but little food, while the active, out-door laborer requires an abundance of stimulating and nutritious aliment. Excessive mental labor also diverts from the stomach those nervous energies so essential to digestion; hence you will find that among the literary portion of community this is a very common disease. Another very prolific cause of this form of indigestion in this country, may be found in the practice of eating too fast, so very common among a large portion of our population in this land of hurry, and bustle, and free institutions, where every man is dependent upon the energy and rapidity of his movements for his advancement or success in any department of business. Hence we find among the boarders of our large hotels, who always eat in a hurry, a great amount of indigestion. This is brought about in two ways; first, an individual who eats very fast is sure to swallow a much larger amount of food than his system demands. The rapidity with which it is forced into the stomach prevents that organ from recognizing and indicating when the requisite quantity has been received. Hence the rapid feeder always eats too much. Not only so, but this habit involves, necessarily, less perfect mastication than where sufficient time is spent in eating. In this condition the gastric juice acts less readily upon the food, and the mucous surface is less efficient in reducing it to the consistency of chyme. In this way the stomach is overburdened and oppressed, and this form of indigestion is rapidly produced. It is also a frequent attendant of chronic disease of the liver, in which case the stomach is very liable to become sympathetically affected. But even before this is the case, the usual general symptoms of dyspepsia may occur. The process of chymification may be properly accomplished in the stomach, but owing to a *deficiency* of healthy bile the further progress of digestion may be very imperfectly performed. This form of indigestion, in addition to the debility, emaciation and other symptoms of dyspepsia, is attended with alternations of costiveness and diarrhea and clay-colored evacuations, and very generally a jaundice-like hue of the eyes and skin. You will find it to be a common practice among nurses where

infants have to be fed, to dilute their milk. This is a great error, and scarcely ever fails to produce its bad effects. The functions of digestion need only to be understood to satisfy any man of this matter. The milk when taken into the stomach must become curdled and the water absorbed before it will digest; and when digestion is delayed beyond a certain length of time, the substance in the stomach has a strong tendency to ferment, and this is a very common cause of indigestion. Almost every article is more or less liable to fermentation, especially vegetables. The symptom of fermentation is eructation of wind from the stomach, and when this is the case it will be well for the patient to change his diet and use a small quantity.

LECTURE XXV.

LOCAL DISEASES—CONTINUED.

Indigestion, Continued: Treatment; Hygienic Treatment—Food, proper and improper—Fluids not advisable—Exercise; Summary; Medicinal Treatment—Neuralgic cases—Spasm of Stomach.

DYSPEPSIA OR INDIGESTION—CONTINUED.

In the *Treatment of Indigestion*, paramount in importance to every other consideration, is attention to diet and exercise. Without reference to these two important matters you need not expect to meet with success from any course of medication that you may adopt; but by properly regulating the habits of your patient in these respects you may often be entirely successful in relieving him, without administering a portion of medicine of any kind; though generally the symptoms can be favorably modified and the cure hastened by judicious medical treatment.

Although there are certain general principles by which we should be governed in the main, both in regulating the diet and exercise of the patient and in prescribing remedial agents, yet each and every case must, to a certain extent, be managed according to its own peculiarities, and the idiosyncrasies of the patient. Hence notwithstanding my directions as to regimen and medicine, as well as the treatment recommended in the books, must necessarily be of a general character, it will be requisite for you to exercise a judicious discretion in each individual case. I shall speak for instance of those articles of diet which are generally admissible in cases of this kind, and of such as are objectionable; but from the experience of the patient, and your observation of his symptoms, you will determine what quantity and quality of food are adapted to his case; and so also in regard to exercise and medicine.

Hygienic Treatment.—It will be borne in mind that we have now under consideration a case of indigestion depending upon debility of the digestive apparatus, and almost always connected with general debility. The *food* allowed the patient should therefore

be easily digested, so that it may not oppress and overpower the stomach; and it should be at the same time nutritious, and adapted to sustain and invigorate the general system. Hence all fat and greasy food of every description should be avoided. Salt meats too are generally objectionable, mainly because they are more difficult of digestion than those that are fresh. Pork of every kind and however prepared should be proscribed, unless under some peculiarities of constitution which rarely occur. Occasional instances may be found where pork appears to agree with the stomach better than any other kind of animal food, and where such is clearly the case it should be allowed once a day. Veal also is an article that should be generally forbidden. It is a fact which would probably be strongly doubted had not experience established it beyond question, that young animal flesh is generally harder of digestion than that of older animals, though extremes either way are objectionable—both old beef and young veal are digested with difficulty, and so of other animals. The flesh of some kind of fowls too, is hard to digest, owing chiefly perhaps to the oil usually contained in it. Geese and ducks however young and tender, will generally be found inadmissible in cases of dyspepsia. The same may be said of most kinds of fish, whether fresh or salted; yet there is one kind of fish which I have found by experience to be not only easy of digestion, but very acceptable to many debilitated stomachs, and it is highly nutritious; I refer to codfish. This is one of my favorite articles of diet in dyspepsia where the patient has been accustomed to its use, or is fond of it. Almost every variety of green vegetables is objectionable, not only because they are indigestible, but also from their tendency to fermentation and decomposition. Cabbage, lettuce, radishes, onions and the like, should in all cases of indigestion be strictly avoided; while ripe vegetables—cooked, such as mealy potatoes, ripe peaches, ripe apples, etc., being articles of rather easy digestion, may be allowed, where there is no constitutional peculiarity barring their use. Pastries of every description are so imperfectly acted upon by the gastric fluid, and so difficult of digestion, as to exhaust the powers of the stomach and produce debility of the organ, where freely used, even in health, and they are of course highly improper in the condition now under consideration. Hot bread and hot biscuit are liable to the same objection, as they form a pastelike mass in the stomach, almost impervious to the gastric fluid and consequently digested with much greater

difficulty than cold bread, which is dissolved with facility; hence, according both to experience and sound philosophy, hot bread is incompatible with the state of the stomach of which I am now speaking, if indeed it should be tolerated under any circumstances. Highly seasoned dishes, containing condiments of an irritating or stimulating quality, that tend to retard digestion by interfering with the proper secretion of the gastric fluid, and by their debilitating influence on the muscular coat of the stomach, are very improper articles of food. Puddings of almost every description, combining the qualities of pastries, hot bread, high seasoned food, and frequently abundance of saccharine matter, are not only difficult of digestion, but they are apt to produce acidity and fermentation, and are in all respects inadmissible in this disease. Hard boiled eggs should not be allowed, and in fact I have some doubts whether eggs in any form are suitable as food for dyspeptic persons; at least I should not recommend them. Soups of every kind are objectionable, not because the articles of which they are composed are necessarily indigestible, but because of the large proportion of fluid they contain, which must be absorbed previous to the commencement of digestion; and before this is effected, fermentation is apt to commence and thus prevent the process of chymification from being accomplished. Instances may occasionally be found, where this form of food will seem to be suited to the peculiar character of the case, but generally soups and indeed all liquid forms of food are unfavorable. Sugar and articles containing it are hard to digest, and tend to promote fermentation and the formation of acid. So also of butter, which, strange as it may appear, is demonstrated by Liebig's analysis to have the same chemical composition as sugar, and consequently the same combining affinities; the only difference being, as is supposed, in the different physical arrangement of their elementary constituents. They both consist principally of carbon, which is also the principal constituent of the adipose matter accumulated in the systems of corpulent persons. This accumulation results from an excess of carbonaceous materials, which as they are not largely employed in the organic structures of the body, are deposited as a reserve store, to be consumed if need be in the combustion of respiration and calorification, but contribute very little to the nutritive process. It is true, you will find in the older physiological works, that butter and sugar are set down as highly nutritious. The fact that the negroes generally grow fat, during the sugar-making season in

the South, has been adduced as evidence of the nutritious character of the saccharine substance. I do not deny that butter and sugar will produce fat; but this is far from being muscle, or tendon, or ligament, or any structure essential to vigor, strength and energy.

Perhaps you are now ready to inquire, since so many articles are proscribed, "Where shall we find diet suitable for the dyspeptic patient?" I answer, it is abundant. Bread at least a day old;—not short biscuit but light yeast bread;—and ripe mealy potatoes—roasted, baked or boiled—are two articles that furnish a large amount of nutriment and are easily digested; and which fortunately, are very generally acceptable to the stomach, where food can be tolerated at all. Unripe potatoes are hard to digest and should not be allowed, but ripe ones well cooked, can generally be digested with facility if taken in moderate quantities. I have already said that ripe peaches, cooked or raw, and ripe apples, stewed, are generally acceptable even to debilitated stomachs; and they serve to give a zest to the plain, simple food to which the patient is necessarily restricted. Milk is in some cases acceptable and easily digested, and where this is found to be the case it is an excellent article of diet, but there are cases in which it will not be borne at all. I will here remark, that I have found cream more generally acceptable, and more easy of digestion than milk, and have often met with cases where small quantities of it, taken with other light food, were appropriated with facility to the nutrition of the system. Ice-cream has often been prescribed in this affection, but according to my own personal experience, and my observation of its use by others, I regard it as of doubtful propriety, to say the least. If used at all, it should be in small quantities, and not too rapidly taken. Cheese is too hard to digest, to be admissible generally in this disease. In my remarks concerning butter, I did not intend to be understood as proscribing the article entirely. On the contrary, I generally allow a small quantity of fresh, sweet butter to be taken with the bread or potatoes. I do not deem it necessary to confine the patient to an offensive or unpalatable diet; but while I would insist on its being light and simple, I would willingly render it as pleasant to the palate as practicable under the circumstances. Hence I should not forbid the prudent use of good butter; but the rancid article, too frequently met with, should not be allowed at all. I have been in the habit of allowing certain kinds of fresh meat also, and experience seems to justify the course. Tender beef, rarely cooked, being easily digested and

with facility assimilated to the tissues of the system, may be used in such moderate quantity as not to overpress or overstimulate the organs of digestion. The same may be said of mutton, well cooked, but not crisped, of venison fresh or dried, or the white flesh of chickens and turkeys, of birds, such as quails, partridges, etc., all of which being principally devoid of oil or fat may be safely allowed in reasonable quantities. Oysters, either cooked or raw, as the patient may prefer, are tolerably easy of digestion, and may be occasionally allowed; but they should not be cooked with milk and condiments, as you sometimes find them in the restaurant, as such cookery renders them difficult of digestion, and totally inadmissible in this condition of the stomach.

As regards the use of fluids I have perhaps already said enough to enable you to anticipate my views. But little liquids of any kind should be taken either during meals, or during the process of digestion, for the reasons which have been already stated. If taken with the food, the liquid must be absorbed before digestion can commence, and if swallowed during its progress, the process is arrested until absorption shall have removed the fluid taken; and in either case it tends to encourage fermentation, or at least afford time for that process, by delaying the digestive function. But between the periods of digestion, innocent drinks are not objectionable. Coffee however, should not be used at any time by the dyspeptic, for it seems to produce debility of the stomach, probably by its primary stimulating effect, followed by a local narcotic or sedative influence on the gastric nerves; and its use is probably a prolific source of dyspepsia. Black tea or cold water is the best drink in such cases, either between meals, or where the patient must use a liquid while eating.

While speaking of bread, I omitted to mention an article of this kind which is often employed with advantage in this affection. I refer to brown bread or bread made of unbolted flour. This, while it is sufficiently nutritious, and as acceptable to the stomach and as easily digested as common white bread, has an aperient effect upon the bowels, and tends to keep them in a soluble condition. As it is not convenient to procure it from the bakery in many places, it may be well to state here, that it should be made of the flour of common wheat without bolting. The flour should however, be passed through a sieve, to remove any extraneous substances, and the coarsest of the bran. The bread is raised with yeast as other bread, but should be baked without being kneaded a second time.

I will now close my remarks on diet by adding, that patients in this disease should not partake of many varieties of even admissible articles at the same meal, as the practice generally leads to over-eating; and mixing several kinds of food together both favors fermentation, and increases the difficulty of digestion.

We come now to another important item in the treatment of dyspepsia; I mean exercise. As a means of restoring healthy action in the digestive apparatus, exercise judiciously taken is of scarcely less importance than the regulation of the diet. Perhaps the want of proper and regular exercise may have been the principal cause of gastric debility in a case for which you are called to prescribe; and if so, attention to this matter will of course be indispensable. In fact there is no condition in which persons can be placed in life, where daily and regular exercise may be safely neglected. Where physical effort is not necessary for obtaining the means of sustenance, it should be performed as requisite to health and vigor. The extent of the physiological influence of bodily exercise is not, I believe, half appreciated by the medical profession, much less by mankind at large. I have heretofore dwelt at some length on the effects of exercise in changing the habit of the human system; and the influence of muscular inactivity in producing atony of the digestive organs, so that it is perhaps unnecessary to detain you with remarks on this subject at this time; I will merely repeat in another form, one or two ideas heretofore presented. Without proper exercise neither the function of absorption, nor that of nutrition, can be efficiently performed, so that an inactive, sedentary life tends to deteriorate the animal tissues, by leaving the old, stale or effete materials uneliminated, long after they should be removed from the system, and their place supplied by new and healthy products of nutrition; whereas regular and judicious muscular activity has a constant rejuvenating influence, making us healthy, vigorous and fresh as the plant in spring. Even young persons, but more especially those who are old, experience the vitiating influence of inactivity, and the habitual neglect of proper exercise does much, not only to promote disease, but to bring on premature decline. In the absence of exercise the stomach is not called into action, there is no relish for food, stimulants are employed to promote appetite and force digestion, where there is no natural demand for aliment, and in this way the nervous sensibility of the stomach is impaired, its muscular energy weakened, and its secretions are vitiated and

all the horrors of indigestion are experienced. No wonder this has been called a "fashionable disease," since habits of indolence and irregularity, the common traits of fashionable life, are so well calculated to produce it.

The mode of exercising the body as a means of cure, is a matter of some importance; for while muscular effort performed in any manner is of more or less advantage, the greatest benefit can be realized from such modes only as bring into play all the muscles of the body. As to the amount of exercise necessary to be taken, much will depend on the previous habits of the patient. Thus a person whose system has been accustomed to laborious efforts, would derive but little benefit from a daily walk or a short ride on horseback, while a person who had been raised in a counting-room, or whose life had been spent in study, would at first neither require nor bear any greater exercise. So that the previous habits as well as the present condition of the patient, should be taken into consideration in prescribing this hygienic measure.

Horseback-riding is a very good exercise, as it in some measure brings into action the muscles of every part of the body, and the amount can easily be regulated by extending or shortening the ride. But there is one mode of exercising the muscular system, where patients can be induced to adopt it, which I have found to be preferable to most others, not only because it requires action in all the muscles, but because it associates the idea of usefulness with that of exercise, and enables the patient to feel an interest in what he is doing. I refer to the labor of sawing wood. I have often directed persons to saw their own wood instead of hiring a sawyer, and whenever my direction has been followed, the dyspeptic has realized much benefit from the exercise. I have even had females exercise in this way when it was inconvenient for them to do so by other means. Females however, who have the care of a household, will seldom lack occasion for ample exercise by attending to their domestic affairs, an employment of which no lady should be ashamed. Riding in a buggy is pretty good exercise on some of our Western roads, but where the road is smooth it has but little advantage, except that it affords opportunity for breathing fresh and pure air; which is indeed an important consideration. In whatever way the patient may exercise, he should do so regularly, and never to the extent of producing exhaustion or much fatigue. Exercise should not be taken just before nor immediately after meals, as it diverts the nervous forces from the stomach to the

muscles brought into action, and thus interferes with digestion; and the same remark is true of mental effort under such circumstances. When it is necessary for the stomach to perform its function, the patient should desist from such physical or mental exercise, and thus avoid this perturbation, which is inconsistent with the concentration of the energies of the system requisite to digestion.

To *sum up* the indications in this affection as regards the habits of the patient, I will say, let his food be plain, simple, and nutritious; let him observe constant regularity in his meals and hours of exercise and rest. About three meals a day at regular hours, exercise between the meals, going to bed early, and rising early in the morning, and partaking freely of pure air, will comprise the outlines of the hygienic prescription to be made for indigestion, dependent on gastric debility.

The *medicinal treatment* must necessarily be of a very simple character, and may be comprehended in two general expressions; mild aperients, if the system requires them, and gentle tonics. These are the principal means, in a medicinal point of view, upon which you can rely in the treatment of that form of dyspepsia which we are now considering; but you must bear in mind the essential difference between this form of indigestion and that which is associated with irritation of the stomach. But enough was perhaps said on this subject, while speaking of the latter form, and I merely refer to it here, to re-impress your minds with the importance of due discrimination between the affections.

As a means of preparing the way for a more speedy cure, it may be necessary, if the bowels are torpid or sluggish, to premise your tonic remedies with a free evacuation of the alimentary canal; but in this you should be governed by circumstances. If the stomach is healthy, with the exception of debility, and if there are no morbid secretions or indigestible ingesta, it will not be necessary to subject the patient to the operation of an emetic; yet I can scarcely conceive a case where it would do much injury. It would certainly arouse the stomach to greater activity; still, unless pretty clearly indicated, I should not generally employ this measure in these cases; and never where there are constitutional peculiarities rendering emetics objectionable. A thorough cathartic will generally be sufficient, and can scarcely be amiss in any case of the kind now under consideration.

Having removed accumulations, and to some degree aroused the

stomach and bowels to increased activity, you should follow up the impression thus made, by the use of such medicines as will give tone to the digestive organs, and secure and sustain a proper degree of activity in the whole alimentary canal, and organs connected with it. To meet these indications, I am in the habit of prescribing a preparation of which I have frequently spoken before, and which may be properly called empirical, if that term be used in its true sense as descriptive of a remedy tested by experiment; for by long experience I have demonstrated its efficiency, having scarcely ever found any thing else necessary. I refer to the compound tincture of tamarac of the American Eclectic Dispensatory. It is to be administered in doses varied to suit the age, constitution and condition of the patient. If there is a torpor of the liver, or a tendency to costiveness, add a small quantity of podophyllum to the bitters, just sufficient to produce one free movement of the bowels every day, and this will be about all the medicine you will find it necessary to employ. It is scarcely necessary to dwell here on the combined properties of this preparation, or to explain in what manner it fulfills the various important indications which it does. It certainly possesses very excellent tonic properties, arousing the stomach from the inactivity into which it has sunk from exhaustion and debility, and giving it tone and sustaining it in the efforts requisite to digestion. It also acts on the liver, and where the biliary secretion is impaired, as is usually the case, is a sufficient corrective. It is an efficient diuretic and will soon manifest a beneficial influence on the renal secretions. It is a diaphoretic, producing gentle perspiration, and it also possesses expectorant properties, and is therefore useful where there is torpor of the bronchial mucous membrane. It therefore fulfills more indications than any ordinary preparation, and although not concocted according to any pre-conceived theoretical dogma, it is commended to your consideration by a much more valuable indorsement, the practical, daily experience of those who have tested its virtues.

Sometimes cases occur in which other simple means become necessary, which I will mention. If the patient has a tendency to diarrhea and acidity of the alimentary canal, I would administer instead of the bitters, the compound powder of rhubarb combined with the bark of wild cherry (*Prunus Virg.*).

Sometimes there will be connected with this form of indigestion, a number of anomalous symptoms, which may prove embarrassing to the young practitioner. I have already referred to the extensive

sympathetic relations of the stomach with the other organs of the body. Owing to these sympathies the stomach is liable to be affected by causes remote from it. Hence it is not at all uncommon for a dyspeptic condition of the stomach to be connected with uterine difficulties. Where this is the case your attention must of course be directed to both of the affected organs, but your remedies should have special reference to the primary difficulty. If the uterine derangement be merely secondary to the gastric and general debility, the ordinary treatment for dyspepsia, with judicious correlative measures directed to the uterine system, will be sufficient. On the other hand, where the difficulty originates in uterine disease, the cure of this will be a pre-requisite to the removal of gastric disorder.

The stomach also sympathizes very strongly with the brain, and over-taxing the latter organ is often the cause of gastric debility and consequent indigestion. In such cases it will be necessary to proscribe mental labor and study, and have the patient engage in moderate physical exercise. Indigestion is sometimes dependent also, on disease of the spinal cord, and this fact should never be overlooked. I shall hereafter have occasion to speak at large of spinal disease, but I refer to it here as occasionally associated with gastric debility. Where such is found to be the case, it will be necessary to cure the spinal disease before you can remove that of the stomach.

A form of indigestion is sometimes encountered, which will not yield to the means to which the affection is usually amenable, but which will be overcome very promptly by the administration of quinia and morphia in efficient doses. This is where the dyspeptic symptoms depend on *neuralgia*, which will usually be recognized without difficulty. The quinia and morphia should be given for a day or two and then suspended, to be repeated if necessary.

There is a symptom which I believe I have not mentioned, which occasionally attends this form of disease, especially during the efforts of the stomach to perform the function of digestion, and that is, spasm of the muscular coat of the organ; and I think I have seen patients suffer as severely from this symptom as from any other cause of pain. I have known the most lion-hearted persons utter groans under the agony of these spasms. In such cases I have always found the compound tincture of Virginia snakeroot to afford prompt relief.

LECTURE XXVI.

LOCAL DISEASES—CONTINUED.

Enteritis: Synonyms; Parts Involved; Symptoms; Diarrhea—Character of Stools—Febrile Symptoms; Prognosis; Post-mortem; Causes: Diagnosis; Treatment for various Causes—Cold—Acid Accumulations—Excessive Bile—Malarial Fever; Diet. Chronic Enteritis: Symptoms; Treatment Diarrhea: Symptoms; Causes, etc.; Treatment for overloaded bowels; Treatment for Atony.

ENTERITIS, OR INFLAMMATION OF THE SMALL INTESTINES.

Synonyms. The subject for consideration this morning is Inflammation of the Small Intestines. The term *Enteritis* is perhaps the best name we can employ to designate this disease, but as the word literally signifies inflammation of the bowels generally, it may be well in the outset to restrict it to the signification with which it will be employed in this lecture. Modern writers have divided the alimentary canal below the stomach into three sections in relation to inflammation, and designate that affection as it occurs in these different sections by the following terms, namely: *Duodenitis*, for inflammation of the duodenum, *Enteritis*, for inflammation of the jejunum and ileum, and *Colitis* or *Dysentery*, for inflammation of the large intestines. The first of these I shall not discuss separately, as the duodenum is very seldom if ever diseased alone, and if it is, there is no satisfactory diagnosis of the fact, and no indications of treatment, differing essentially from those pertaining to the affection where the stomach or intestines generally are involved. With this exception, therefore, I shall pursue the arrangement just mentioned, and shall apply the term *Enteritis* to inflammation of any portion of the mucous membrane of the small intestines. Peritoneal inflammation was formerly embraced under this title, but as we shall consider that as a distinct affection under the name of peritonitis, it is not comprehended within the signification of *Enteritis* as now employed. From the fact that the inflammation of which I am about to speak is most frequently

located in the ileum, it has by some authors been denominated *ileitis*, and by others *ileo-colitis*, from the fact that the colon is apt to be more or less involved when the ileum is inflamed. Let us not however, be confused by a multitude of names.

I repeat then that the subject of the present lecture is *Enteritis*, or inflammation of the mucous membrane of the small intestines. It is somewhat difficult to conceive of inflammation as existing for any length of time in any portion of the alimentary track, without being extended by continuous sympathy to other portions of the mucous surface of the tube. Hence it is, that inflammation of the small intestines, and especially of the ileum, is almost always extended in protracted cases to the colon, with the diagnostic symptoms to be mentioned presently.

The two extremities of the small intestines, or the duodenum and ileum, are more liable to inflammation than the jejunum. The last-mentioned portion appears to be very seldom the seat of disease, although it would appear at first thought to be as much exposed to irritating influences as either of the others. But the duodenum is in more direct association with the stomach and liver, and consequently more liable to be sympathetically affected when they are diseased. The ileum too is situated in a position which will readily account for its liability to irritation and inflammation. The diminished caliber of the ileum at the lower part, and especially at its entrance into the cæcum through the ileocecal valve, is certainly calculated to retard the progress of the intestinal contents, and hold them longer in contact with the mucous surface, and thus subject it more fully to the action of any irritating substance which may be present, than in the upper portion of the tube.

Symptoms. Inflammation of the mucous membrane of the small intestines usually commences with uneasiness, often obscure in the commencement, but gradually increasing until positive pain of a griping character, and more or less constant, is felt about the center of the abdomen. The most severe pains will be felt, generally in paroxysm, with a constant sensation of distress between them. The griping is sometimes so severe in children as to cause convulsions, and in adults the suffering is often very great. In other cases there is but little pain. Sometimes the pain instead of commencing gradually, is violent from the first. The uneasiness, I have said, is usually felt about the center of the abdomen, or umbilical region; this however, depends in some measure on the

locality of the attack ; if the inflammation is in the duodenum or first portion or the jejunum, the distress will be felt higher, more deep seated, or possibly referred to the back ; whereas, in case the ileum is the part affected, and especially the lowest portion of it, the pain will be in the hypogastric, extending also into the right iliac region. There is usually more or less tenderness under pressure, corresponding in some measure to the amount of pain experienced ; and this symptom serves perhaps better than any other in fixing the location of the inflammatory lesion.

Diarrhea is a very common symptom of enteritis ; being rarely absent, unless in cases where the disease arises from obstruction. If however, this symptom has not appeared, it may at any time be easily produced by the mildest purgatives, which is a circumstance calling for great care in respect to their use. The evacuations are somewhat peculiar, and their character should receive attention. If the disease is confined to the small intestines, they will be watery, generally of a dirty yellow color, and containing but little mucus comparatively ; but when the colon is likewise involved, there will be more mucus, and that often mixed with blood, in the discharges. Such an extension of the inflammation into the colon will also be marked by tenesmus, and by the more severe bearing-down pain of dysentery, in addition to the griping, twisting, or cutting pains of enteritis. Of course the evacuations will at first be mixed with fecal matter, but when this shall have passed off, they will assume the sero-mucous character of which I have spoken.

In some instances the stools are decidedly bilious during the whole progress of the disease, indicating that the liver has taken on a sympathetic action. This is more apt to be the case where the duodenum is involved in the inflammation or becomes highly irritated. More commonly there is a deficiency of bile in the evacuations. When bile is present it is apt to be changed, so as to impart a greenish color to the dejections. It is therefore, important that you give special attention to the character of the evacuations, so much is to be learned therefrom respecting the real condition of your patient ; and what I said on a former occasion, I now repeat, that you should not trust others to examine the matters discharged and rely upon their reports, but see and examine for yourself. I have rarely found even a physician who observed with the scrutiny necessary to the formation of a correct judgment, as to the amount of bile, its character, and the other

peculiarities of evacuations in diseases of the bowels, which serve as the basis of true diagnosis.

The bowels are not usually bloated or distended with gas, to the extent of producing tympanitic symptoms, but occasionally, and especially in children, and in very protracted cases of adults, this symptom is present. Generally, the abdomen is in a collapsed or sunken condition.

Febrile symptoms are usual accompaniments of enteritis, but they are not generally as intense as in many other cases of inflammatory disease. We usually find the pulse somewhat accelerated, but open and full; very unlike the rapid, quick pulse characteristic of peritoneal inflammation. The skin will be more or less hot and dry, the tongue moist and slightly coated, and the urine scanty and highly colored.

The febrile symptoms sometimes precede those of local disease, in which cases they are usually more prominent, as the reaction is apt to be much greater; and it is very common under such circumstances to find the fever exhibiting the remittent character; coming on with the initiatory symptoms of bilious fever, and presenting more or less marked remissions. This complication of enteritis with periodic fever, is especially frequent during the prevalence of the autumnal fevers in this western country, as will be verified by every intelligent and experienced practitioner in this region. Where this is the state of the case, there should be no hesitancy as to the course to be pursued, after what I have so frequently reiterated in similar relations. Arrest the periodic fever before you advance another step, and in nineteen cases out of twenty the inflammation will yield at once. On the contrary, if you undertake to treat the inflammatory disease first, you will soon in all probability, have a troublesome case on your hands; and if you do not lose your patient you may deem yourself fortunate.

The general character of this disease is mild and its *prognosis* favorable. Where there is but little pain, diarrhea, or fever, it usually terminates in health in a short time, even without treatment. Where the symptoms are more severe, it generally yields with readiness to simple, but appropriate treatment, whether the inflammation is a primary affection or a secondary one, resulting from fever. Though some cases, of the latter description especially, and under improper management in the beginning, assume a very grave character.

Where this is the case, and indeed where from any cause the disease assumes an unfavorable aspect, the symptoms I have described become aggravated. The pain increases as the inflammation extends; the discharges become more offensive; the colon perhaps becomes involved, with all the symptoms of dysentery; or the stomach becomes implicated, as demonstrated by nausea, vomiting, pain and tenderness in the epigastrium; the skin and eyes become yellow, indicating involvement of the liver, or at least closure of the bile duct: the tongue becomes red and dry; the brain and nervous system are affected; delirium perhaps appears; the pulse is frequent and feeble, and the patient gradually sinks, from prostration, or suddenly dies, owing it may be to perforation of the intestine, or to mortification. If the case does not prove fatal it may run into the chronic form of inflammation, or the patient may recover after a tedious and prudently-managed convalescence.

The *post-mortem* developments you can perhaps readily anticipate. They do not materially differ from those following inflammation of the mucous membrane of the stomach. Generally, the appearances will differ in different localities, presenting it may be the evidences of every degree of inflammation, from redness and thickening of the mucous membrane, or enlargement and injection of the follicles, to extensive and deep ulceration, or occasionally, gangrene and sloughing. Generally speaking, the depth of the ulcers will depend on the violence and duration of the inflammation. In some instances they barely involve the mucous membranes; in others they pass through the submucous tissue, the muscular, and occasionally the peritoneal coat, producing perforation of the intestine, which if it does not produce sudden death, will result in peritoneal inflammation, and finally in death, with scarcely any exception. Sloughing or gangrene is sometimes found, though rarely, perhaps because the disease wears out the powers of life before the point of disorganization is reached.

The *causes* of this disease are numerous and various. A very common cause is exposure to cold. I am familiar with a number of individuals who have apparently no other predisposition except to disease of the bowels, but in whom the slightest exposure will frequently develop this affection, with more or less violence. There is perhaps in a majority of individuals some predisposition to morbid affection in some organ of the system. The weak point may be the lungs, the brain, the liver, the stomach, or some portion

of the intestines, or indeed any organ of the body, and wherever the predisposition to disease exists in an organ, slight causes may suffice to develop it. Some persons think they never "take cold" because they never are not troubled with a cough, but perhaps these very persons will take inflammation of the bowels upon sudden exposure to cold or by getting wet in a shower. And in order to "take cold"—a very vague expression, by the way—it is not necessary that the individual shall be exposed to a low degree of temperature. I need not make the remark that there is no such thing in existence as "cold," but that the word simply indicates the absence of heat, and has merely a relative signification. If you pass from a room heated to 100 degrees Fahr. into one in which the thermometer stands at 70°, you are exposed to a greater transition, than by passing from an atmosphere at 50° into one where the mercury stands at the freezing point. It is the sudden vicissitude of temperature which destroys the equilibrium of the system, and develops disease at the weak point.

A very common cause of enteritis is the sudden recession of eruptions from the surface. This is especially frequent with children that have any of the exanthematous diseases; or the eruption commonly called "rash," which is itself dependent on gastric and intestinal derangement. It is also said to result from metastasis of gout and rheumatism; which is not at all improbable; and cases believed to be of this nature are generally attended with very distressing symptoms. It may result also from the suppression of accustomed discharges.

Another frequent cause of enteric inflammation is the presence of irritating substances, such as indigestible articles of food, which, having resisted the action of the stomach, have passed in a crude or slightly altered form into the small intestines, where they irritate the mucous membrane until inflammation is developed. Acrid or morbid secretions, especially vitiated bile, are doubtless often the cause of inflammation of the bowels. I have seen many cases where I was confident the whole difficulty resulted from acridity in the biliary secretion, and which would not be relieved until this secretion had been corrected. Accumulations and induration of the ordinary contents may occur from inactivity of the bowels and produce inflammation. Relaxation resulting in intussusception or invagination, and strangulation from hernia, etc., are also causes of inflammation of the small intestines.

I need scarcely add that enteritis is a frequent attendant on

other affections, general or local, as fevers, whether malarial or contagious; consumption, gastritis, hepatitis, etc.

The *diagnosis* of enteritis is not very difficult. The two principal affections with which it is liable to be confounded are peritonitis and colic. From peritoneal inflammation it may be distinguished by the fact that diarrhea, a very usual symptom in enteritis, is seldom present in peritonitis; on the contrary, constipation generally attends the latter disease. In peritonitis there is almost invariably tumefaction or a tympanitic condition of the bowels, with tenderness over the whole abdomen; while in enteritis there is seldom much tympanitis, and the tenderness is generally circumscribed, or at least most severe in a limited space. Nausea and vomiting are usual in peritonitis, but not in enteritis, unless gastritis exist at the same time. The pulse affords a very marked distinction between these two affections; in enteritis it is not very frequent and is open and full, while in peritonitis it is small, rapid and hard. By attention to these various peculiarities you will have little difficulty in distinguishing between inflammation of the mucous and serous surfaces of the intestines.

From colic this disease is distinguished also by very clearly marked symptoms. The absence of diarrhea and of febrile symptoms in colic, and the fact that pressure on the abdomen rather relieves than increases the pain, are sufficiently diagnostic circumstances upon which to base a satisfactory opinion.

The *treatment* of enteritis will of course depend very much on the producing cause, and I will give the leading indications presented by the disease under different origins.

If you have a case which is produced by exposure or "cold," without evidence of accumulation or other causes of obstruction to be removed; with no invagination of the intestines to relieve, and no recession of eruptions, nor translation of gout or rheumatism to be diverted, but a plain, simple case of inflammation arising from cold, is it not perfectly clear that such treatment as shall establish the cutaneous transpiration and equalize the circulation, will be likely to remove the disease? Secure a general and copious perspiration, and employ revellents to attract the circulation to the surface, and you will in most cases relieve your patient immediately. I have seen cases relieved in one or two hours by the administration of comp. tinc. serpentania. This preparation allays the irritability of the bowels, and powerfully determines to the surface, thereby equalizing the circulation. Let a sinapism be

applied over the bowels as long as it will be borne, and followed by hot fomentations after its removal; and let hot bricks be applied to the feet. Let the sudorific tincture be given in drachm doses once in two or three hours with warm tea, as balm, catnip or the like, and let this be continued until a copious perspiration is brought about over the whole surface, and kept up for an hour or two. This will generally be all the treatment required to arrest this form of enteritis.

Where the disease is produced by acrid accumulations in the intestinal canal, the first indication is the removal of such accumulations. In the selection of an article to fulfill this indication, it is important that you exercise discretion; for while it is necessary to have an agent that will certainly accomplish the object, it is equally important to avoid any thing like a drastic or irritating purgative. I know of nothing better adapted to this state of things than compound powder of rhubarb; for while it operates mildly in the removal of accumulations, it effectually neutralizes all acidity and thus diminishes materially the irritating tendency of the intestinal contents. It should be given in sufficient doses to act effectually, and repeated until the bowels have been freely evacuated; which will generally be effected by about two drachms of the powder, digested in a pint of water, strained and sweetened with loaf sugar, and given in four doses with an interval of an hour and a half between. Frequently, sufficient action will be produced by the first or second dose. Meantime, other means, adjuvant to this, may be employed with benefit, such as counter-irritation and fomentations as just recommended under the other cause. After the removal of all irritating substances from the bowels, you have a case of simple inflammation of the mucous membrane of the bowels, which is to be managed by means of the most soothing treatment adapted to allay irritation. Mucilaginous drinks, with small doses of morphia; injections of starch with small portions of laudanum, especially where there is diarrhea and dysenteric symptoms; perfect repose and very light diet, are about all that will be necessary.

If you have a case of retrocession of an eruption from the surface, your treatment will be counter-irritation and gentle diaphoresis. Hence a large sinapism over the abdomen, followed as before mentioned by hot fomentations, is indicated, with such other revulsive measures as are familiar to every practitioner; and internally, moderate doses of the diaphoretic tincture. If it is from

translated rheumatism or gout, let counter-irritation be applied to the whole length of the spine, and if the particular location of spinal irritation can be detected—as it often may be by pressing upon the roots of the spinal nerves successively, until a tender point is discovered—let a dry cup be applied to that point and then apply a sinapism to the same part.

If the disease is produced by an excessive secretion of bile, you should administer small doses of podophyllin and leptandrin combined with compound powder of ipecac. and opium. In this prescription you secure the stimulating influence of the podophyllin and leptandrin in exciting healthy action of the liver, combined with the anodyne influence of the diaphoretic powder. If diarrhea be an urgent symptom, you may, instead of the diaphoretic powder, give the tincture of catechu and paregoric, combined in equal quantities, in drachm doses as often as necessary.

If it is dependent on intussusception or invagination of the intestine, your success must of course depend on your ability to relieve this condition. This is a difficult case, and I shall speak of it more fully hereafter. I will remark however, that I have relieved this difficulty by introducing as far into the rectum as practicable, the tube of a stomach-pump, and filling the intestines with water. If the invagination is at or below the ilio-cæcal valve, this is pretty certain to reduce it; and if it is above that point, although your injection may not reach it, yet by the distension of the colon and the movement in the intestinal convolutions thereby produced, you may cause a reduction of it.

Another means which has been employed is the application upon the abdomen, of a vessel, as a large tumbler, in which a partial vacuum is produced by burning a pledget of cotton within it. Or in an extreme case, the receiver of an air-pump might be employed. Such means are said to have produced successful results.

But where the cause of inflammation of the bowels is malarial fever, the case is a plain one. Before you proceed a single step in the treatment of the local inflammation, arrest the periodic fever and in nineteen cases out of twenty the inflammation will yield at once. On the contrary, if you undertake to treat the inflammatory disease first, you will soon in all probability, have a troublesome case on your hands; and if you do not lose your patient you may deem yourself fortunate. The remedies for the arrest of the fever have been already fully set forth, and should the inflammation

have proceeded too far to terminate spontaneously, such treatment as has been directed for simple enteritis will of course be indicated.

The *diet* in this disease, under all circumstances, must be rigidly simple and bland, and the patient must be kept still; this, however, is not generally a difficult matter, for with symptoms at all severe, he will be disposed to take and keep to his bed.

CHRONIC ENTERITIS.

Enteritis often assumes a *chronic* character, and then the mucous surface of the whole intestinal track is very apt to be involved. This chronic form of enteritis was quite prevalent among the soldiers who returned from the recent campaigns in Mexico. I have seen a number of these cases, and a brief description of them may not be out of place here, as they will serve as marked instances of that form of disease of which I am now speaking.

The symptoms in all these cases were as follows: a red tongue, and the color was not confined to the edges and tip, as in ordinary cases, but the whole tongue and mouth was as red as raw beef; a tympanitic condition of the abdomen with soreness under pressure; there was generally extreme emaciation, with a small and frequent pulse, and every thing to be observed indicated very conclusively, marks of extensive and protracted disease; the skin was dry and parched, the extremities cold, the appetite in most instances entirely gone; thirst urgent, the urine scanty and high-colored, and there was generally more or less irritation of the lungs, causing a troublesome cough. The discharges were of a dirty watery character, with which matter of a slimy appearance was mixed; showing plainly that ulceration of the mucous follicles existed.

These cases were produced by protracted attacks of bilious fever with bad treatment; and it often follows cases of this kind, where active, drastic purgatives have been resorted to in the early stage of the disease; but wherever the febrile symptoms are promptly removed, you will rarely find any such effects following malarial fever.

The *treatment* of this form of inflammation, is unquestionably of more importance to you than any thing else I can further say in regard to it; for you will seldom have any difficulty in forming a correct diagnosis in these cases. I have had occasion to treat a number of the cases from Mexico, and every case to which I have been called has recovered; though some of them were tedious, recovering very slowly. One case of the kind I will particularly

mention, which had been treated during two years by a number of physicians, and given up as hopeless. He was extremely emaciated, with an almost black appearance of the skin: there being large dark spots over the whole body, while the intervening surface presented by no means a healthy appearance. The tongue, evacuations, and symptoms generally, were very much as I have just described them in my general remarks. I put this patient upon a very simple, mild course of diet, such as rice, and stale bread, with no animal food, and administered compound powder of rhubarb, to which was added a small portion of wild-cherry bark, to be taken in doses three times a day. I had him bathed regularly in whisky and broke water; and in addition applied compound tar plaster to the whole abdomen. This irritating plaster differs materially in its effect from other irritating applications; for while it makes a sufficient impression upon the surface, equal to that of any other, it may be borne with impunity, as it does not produce debility, nor constitutional disturbance. Tartar emetic exhausts the patient, without producing nearly so beneficial a local effect. In connection with these means the compound tincture of catechu and paregoric in equal parts was administered once or twice a day, not to arrest but to restrain the looseness of the bowels; for in all these cases the more frequent the evacuations, the more will the patient be reduced, and the longer will the disease continue.

If the liver is torpid it usually returns to its proper function when the local difficulty is removed; but if it should not, it may be excited to healthy action by a small dose of podophyllin, leptandrin and ext. taraxacum combined in the form of a pill, taken daily on going to bed. With this course of treatment, varied of course to meet peculiarities, I have usually been successful.

I can not avoid adverting in this relation, to the treatment pursued in similar cases in the Commercial Hospital of this City under the medical oversight of the faculty of the Medical College of Ohio. I had an opportunity last winter of seeing a well-defined case of this description under their management in that hospital, and I would appeal to every honest man of common sense, whose natural judgment is not swayed by professional prejudice or false teaching, and who will examine the records of that hospital, to say whether the treatment there employed is not opposed to sound philosophy; especially when taken in connection with the bills of mortality following it. Very few of the unfortunate individuals

who entered that institution with this disease ever left it, except to be carried to the grave.

DIARRHEA.

This term signifies literally "pouring through," and is applied to purging in general. Consequently we have, as has been shown, diarrhea dependent on inflammation or irritation of the small intestines; diarrhea connected with typhoid fever, etc., and we shall hereafter have occasion to speak of diarrhea connected with and dependent upon chronic colitis or dysentery, hepatic disease, epidemic cholera, cholera morbus, cholera infantum, etc. In this place I only propose to call attention to a form of diarrhea, which does not depend on local inflammation or irritation, nor active constitutional disease. The affection of which I now speak appears to be dependent on mere debility of the bowels, either habitual or temporary.

Debility or *atony* of the bowels may in one sense be merely *relative*, that is, there may be sufficient tone or energy in the organs to enable them to perform their functions in a healthy manner under ordinary circumstances; but when an extra duty is imposed, or a slight perturbing influence brought to bear upon them, their weakness will be manifested. Thus among persons accustomed to overload their stomachs with food, you will occasionally find one whose meals are habitually followed by semi-fluid alvine discharges. This has been denominated *crapulous diarrhea*. Again you will meet with many persons who can not bear sudden intelligence, whether joyous or sorrowful, nor experience alarm, anger, nor any other strong mental agitation without an attack of diarrhea. The vessels of the mucous membrane appear to be suddenly relaxed in both these forms, and an extra quantity of serum thrown into the bowels, while the peristaltic motion is increased by the presence of the food in the one case, and by nervous excitement in the other, and a diarrhea is the consequence. The same consideration will account for the diarrhea sometimes occurring in hysterics.

The *treatment* for this affection is very simple. Where the bowels are overloaded they should of course be relieved by a cathartic, for which purpose the compound neutralizing physic is very appropriate. A dose of castor oil would also answer the same end. Beyond this, a prevention of the cause, whether that

be improper eating or nervous excitement, will of course be necessary; which together with some gentle tonic, combined if need be with an astringent, at first, will be all-sufficient. The infusion of ptelea in tablespoonful doses four or five times a day will be all the tonic necessary, and where an astringent is found necessary, an infusion of marsh rosemary, of geranium maculatum, or of blackberry root may be employed.

But there may exist a state of *positive atony* or debility, in which there will be habitual diarrhea without pain, fever, excitement of the pulse, redness of, or fur on the tongue, or any other symptom indicative of inflammation or irritation. This condition is often found to remain, following febrile and inflammatory diseases, long after all symptoms of such disease have disappeared. But it occasionally occurs without any previous irritating cause of which you can become aware.

The nature of this difficulty appears to be a relaxed condition of the secreting vessels of the mucous membrane, so that they are unable to retain the fluids forced into them by the circulating current, and hence, instead of the moderate amount of moisture necessary to mollify the food and lubricate the tube, there is discharged into the alimentary canal a large amount of serum, with portions it may be of fibrin, or even the red globules, which imparting a watery if not a bloody character to the contents, is passed off, constituting a diarrhea of pure debility. This tendency is much heightened by an anemic condition of the circulating fluid, and where it becomes much increased, a passive hemorrhage may be the result. The appearance of the discharges is, of course, variable. Their color may be light yellow or green, according to the quantity and quality of the biliary secretion.

The treatment in these cases will depend very much upon the circumstances in each case. If the liver is torpid, a very small pill, say $\frac{1}{2}$ gr. podoph., $\frac{1}{2}$ gr. leptand., and q. s. ext. tarax., should be taken once or twice a day. The bowels may be held in check and their motions properly regulated by our compound neutralizing cordial, aided if need be by some efficient astringent, as tannic acid, infusion of marsh rosemary, geranium maculatum, or blackberry. In connection with these remedies the infusion of ptelea may be relied upon as a tonic, or in its absence, the quassia, columbo, or gentian may be employed. In some cases an infusion of cinchona may be of much advantage.

The diet must be light and easily digested, but nourishing and

constipation or diarrhea. There is always considerable febrile reaction, if the case is at all severe, but this may not appear until the local inflammation has become established. But the circumstance under which the Western physician is most frequently required to manage dysentery, is where it is associated with malarial fever, in which case it is often, though not always, preceded by the development of the periodic fever. I say it is not always preceded by the fever, even where the latter presents very clearly the periodic character; for the inflammation may be the primary disease, and the secondary fever be rendered periodic by the prevalent malarial influence. But the association of the two diseases is remarkably common, according to my observation, and that of others with whom I have conversed. I have learned from members of this class, who have been practitioners in different parts of the country, that this complication is very prevalent in their respective localities. Such indeed, is the testimony of all who have any experience in the diseases of miasmatic districts, and when dysentery occurs in this form it is generally regarded as most difficult to manage.

When the disease is thus associated with *malarial fever*, there will generally, be a slight chill and febrile reaction, preceded by the incipient symptoms of remittent fever, such as debility, lassitude, disinclination to exercise, uneasiness in the head, back and limbs, and general derangements of the various functions. The dysenteric symptoms, as before remarked, may precede the febrile, or they may occur at any period of the progress of the fever.

Dysentery often occurs as a *sequel* of other diseases, especially of badly managed fevers, such as bilious, congestive and typhoid, where the bowels have been irritated by drastic medicines.

The disease occurs with every grade of severity, from a slight irritation to the most extensive and active inflammation of the mucous surface of the large intestines, and is accompanied by an equal diversity of symptoms, from those of a mere local character, tending to subside without medicine, to those of the most violent constitutional disturbance, or of a low grade of adynamic disease, as presented in typhoid fever. The violence or malignancy of the disease will depend upon the constitutional peculiarities of the patient, and also on the nature of the producing cause. Hence you will find a great difference in the grade of the disease in different patients, even during its prevalence as an epidemic. Those of robust constitutions and general health, if they take it at all, will

usually have a light attack, while debilitated persons are not only more likely to take it, but to have it severely.

Symptoms. An early and very common symptom of dysentery, before the disease is fully developed, is a vague uneasiness in the lower part of the abdomen, generally accompanied by diarrhea. In fact there is no mode of introduction of dysentery more common than by diarrhea, more or less profuse and protracted. This is very generally one of the earliest symptoms where the disease is prevailing epidemically; but the diarrhea is under such circumstances accompanied by soreness and a sense of weight and pressure in the lower part of the bowels, by which it is clearly distinguished from the diarrhea of mere debility. This last-mentioned symptom increases as the disease becomes developed, and in severe cases produces the most intolerable distress. It occasions a constant desire to go to stool, even after the bowels have been completely evacuated and the effort to have a passage gives partial temporary relief, although nothing at all, or only a little bloody mucus may be discharged. The frequency of these efforts at evacuation will vary, with the severity of the case, from one in two or three hours to one every five minutes. The *tenesmus*, as this symptom is called, is sometimes attended by such spasmodic efforts of the muscular coat of the rectum that prolapsus ani is produced, especially in children, which is a very distressing and troublesome occurrence. Every evacuation although it appears to give present relief, tends to increase the irritation, and consequently the desire to go to stool, and the pain and spasm attending the discharges; and the patient should, as far as practicable be induced and assisted in resisting the desire to get up.

The character of the evacuations varies greatly in different cases. In some they consist of pure mucus, in others of pure blood, and in others of mucus mixed with blood, which last is their most usual appearance. Sometimes the discharges seem to be a kind of blood-stained serum, resembling, as I have heretofore described it, water in which fresh meat has been washed. This is a grave symptom, and most common in epidemic dysentery. It indicates a low condition of the vital forces, and a tendency to decomposition in the mucous tissue. The pain and tenesmus are perhaps most severe in cases where the discharges are principally mucus; for where they consist of pure blood the local depletion affords more relief; while the sero-sanguinous evacuations are attended with general debility and severe griping pains throughout the

abdomen, but not so much irritation of the rectum. Occasionally, small lumps of hardened fecal matter will be passed, causing much pain, but followed by great relief. But in any case and under all circumstances, this disease when fully developed, is attended with much distress, more perhaps on an average than any other to be met with in practice.

Connected with the local symptoms I have described, are usually others of a more general character. Unless it be a very mild case there will be pyrexia, whether the affection occur under malarial influence or not. Hence you will generally find an excited pulse and hot skin, and general derangement of the secretions. The liver is apt to be torpid or else over-excited, and its secretions vitiated; the stomach in severe cases is often affected, causing vomiting. The urine is generally scanty and high-colored, and as the bladder and urethra sympathize by proximity with the inflamed bowels, much pain is experienced in micturition, often amounting to strangury. In females, the vaginal mucous surface often becomes affected, producing more or less leucorrhœal discharge.

The pulse of course varies in this as in other disease. It has not generally however, the irritated character common to many other inflammatory affections. It is usually somewhat accelerated, but open and full, but differs greatly in accordance with the severity of the local inflammation, and the condition of the general system. You will sometimes find a hard, rapid pulse, with a cool, clammy skin, which let me remark, are grave and very alarming symptoms.

The extent of the inflammation may generally be determined by the pain felt under pressure, when made along the course of the colon. If there is soreness in the upper portion of the abdomen it indicates that the transverse colon is involved, and in this case the stomach is very likely to participate in the disease and nausea and vomiting follow. The right or ascending colon may also be inflamed, in which case pressure on the right side of the abdomen will produce pain. Sometimes the ascending, or even the whole colon is affected in the commencement, which is most usually the case where the disease commences with diarrhea. In other cases the inflammation commencing in the rectum or lower part of the colon, is propagated upward by continuous sympathy until the whole colon, the cœcum, and even the small intestines are involved. In the case last mentioned there will of course be general tenderness of the abdomen, and the usual symptoms of enteritis will be superadded to those of dysentery.

The *tongue* in simple cases of dysentery, is generally moist and slightly covered with a whitish fur. But where the liver is much deranged it will be loaded with a yellowish coat; and where the stomach becomes involved the edges and tip will be red, and perhaps the surface gashed. Sometimes the coat will come off, leaving the whole surface fiery-red as described in gastritis, especially in the last stage of the disorder.

I have already remarked that the *liver* is generally *torpid*, but that occasionally there is an *excessive discharge of bile*. This is indeed the first symptom in some cases, where the diarrhea is of a bilious nature, and the acrid character of the secretion acts as an irritant upon the mucous surface, and thus produces inflammation. Cases of this kind are usually denominated *bilious dysentery*.

Dysentery in children is sometimes caused by *worms*, in which case the attack is preceded and attended by the usual symptoms denoting the presence of *worms* in the alimentary cana.

There is another form of the disease to which I may as well refer in this place as any other. It is the *adynamic dysentery* of the books, being thus named from the deficiency of vital energy in patients affected by it. It is usually found in armies, hospitals, and densely populated cities, where disease is produced by the decomposition of animal matter and the absence of a free circulation of fresh, pure air. It is characterized by a small, frequent pulse, and usually preceded by diarrhea. The skin is cool in some cases, in others there is a pungent heat, but always a manifestly low condition of the capillary circulation. Dark livid spots are often seen on the surface, and sometimes elevations resembling the petechiæ of typhoid make their appearance. The disorder very often partakes evidently of the character of dysentery proper and typhoid fever, and is without doubt the result of causes, calculated to produce the one, acting on the system conjointly with those tending to develop the other. Dysentery in this adynamic form is not an uncommon sequel of typhoid and congestive fever, and it is always to be regarded as a very grave form of disease.

I have already spoken of this affection as associated both primarily and secondarily with periodic fever. I will take occasion here to add, that where the disease occurs in such a location and at such a season as to suggest the probability of malarial influence, it is perfectly safe to treat it as resulting from that cause, even where no distinct periodic features are presented. I have adopted the plan of treating the disease under such circumstances with a


distinct reference to the malarial origin, without even waiting to discover a periodic tendency, and I have abundant reason to be gratified with the results.

Another form of dysentery, said to occur occasionally, is where the disease results from a translation of rheumatism. Those of you who were in attendance last winter saw a pretty well marked case of this kind in the Commercial Hospital. This form may be known, generally, by its being preceded by a rheumatic condition of the system, perhaps seated in some organ or location, and by a sudden metastasis of the reflected irritation from its former seat to the large intestines.

The *prognosis* in dysentery will of course depend on the violence of the symptoms, and its complication with other affections. Occurring alone, and in the usual form, especially where there is no epidemic influence, the prognosis may be regarded as decidedly favorable; it is not under such circumstances difficult of removal. But where it is associated with certain other diseases, or follows typhoid or congestive fever, it may be regarded as a very dangerous disorder, though not necessarily fatal, as prompt and judicious treatment will generally prove successful even in these grave forms.

I think indeed, that we should set down the general *prognosis* of dysentery as favorable, for I am confident that not more than two per cent. of all the cases of it should be lost. You may perhaps suspect this to be a hasty estimate, but I assure you I speak advisedly; being sustained not only by the results of my own practice, but also by those of others who have pursued what I regard as a proper course of treatment.

The *causes* of dysentery have been already mentioned in speaking of it in various forms; still it may not be amiss briefly to recapitulate them here. So far as regards sporadic dysentery, cold may be stated as a frequent cause. Persons naturally predisposed to irritation of the bowels, or in whom such a predisposition may temporarily exist from any cause, may by sitting in a draft of air, or on the damp ground, bring on an attack of dysentery. Another frequent cause of the disease is the presence of acrid and indigestible substances in the alimentary canal. These may consist of articles swallowed as food, but which not being digested, have passed into the intestines and produce irritation, especially if detained in their progress, as they are likely to be, in the pouches of the colon. Or the irritating materials may be the production



of vitiated secretions of the liver, pancreas, mucous follicles, and intestinal glands. The great prevalence of intestinal diseases generally in the summer season, and especially among children is, I am confident, owing mainly to the habit of eating indigestible vegetables so common at that season. The summer-complaint, as it is familiarly called, among children, is very commonly due to this cause, and it is often kept up and aggravated by the continuance of the cause until cure is beyond hope. The effect is nearly as bad for the mother who is nursing to eat such food, as to feed it directly to the child.

But the most serious and important cause of dysentery is the epidemic influence, associated as it generally is in this country, with malarial poison, and it is in this form of disease that not only the reputation of the practitioner, but also the lives of his patients, depends to a very great extent on a correct mode of treatment. Sporadic dysentery will generally get well if left to the unassisted efforts of nature, though judicious treatment will diminish suffering and hasten the recovery; but in epidemic dysentery, where the nervous system is brought under the depressing influence of atmospheric poison, and the blood and all the secretions are thereby vitiated, the tendency is very often from bad to worse until the patient is relieved by the hand of death, made welcome through intensity of suffering. It is in this disease, and especially in this form of it, that the prompt and well-directed prescriptions of the physician will be more fully appreciated perhaps, than in any other condition of the human system.

Upon *post-mortem* examination, signs of inflammation are always found in the rectum and the lower portion of the colon. The appearances are not uniform in all cases, but vary from mere redness and thickening of the mucous membrane to ulceration, or even gangrene, which may involve the submucous and muscular tissue of the tube. The surface of the bowel is sometimes covered by a coat of coagulated lymph, while in other cases the mucous membrane itself has been removed in patches, probably by extensive ulceration, and the discharge of a slough. As would be inferred from the symptoms described, cases occur in which the mucous membrane of the whole colon, or patches in every portion of it, evince similar signs of disease. The bowels and stomach will also be found in some instances to have been more or less affected by inflammatory action. The mesenteric glands are generally enlarged and softened, where the case has been protracted,

and the liver often presents evidence of engorgement and sometimes of inflammation. Occasionally hepatic abscess may be found, especially in the dysentery of southern countries. In the adynamic form of the disease, the mucous membrane is generally very much changed, and if not actually in a disorganized condition, verging closely upon it.

In speaking of the *treatment* to be employed in dysentery, I must repeat what has been said in reference to every variety of inflammation. The cause is the most important subject of inquiry. I can not too often reiterate this principle, nor too deeply impress it on your memory. It is more than folly, it is madness, to attempt the treatment of any disease without reference to the cause that has produced it, where such cause can possibly be ascertained. Nothing shows such want of science, in a practitioner, as does inattention to the origin of disorders for which he prescribes. To be always ready to give a prescription for inflammation, or fever, or headache, or any other affection, without inquiry into such symptoms and facts as may tend to refer the disease to the exciting and even the predisposing cause, is downright quackery. An individual has dysentery, we will suppose, as indicated by frequent bloody discharges, tenesmus and fever. Is it a matter of no consequence whether the disease has been produced by inspissated fæces long retained, by indigestible food, by vitiated and acrid secretions, by translated rheumatic irritation, by malarial fever, or by epidemic influence? If no inquiry is to be made in regard to these questions, and remedies are not to be adapted to the removal of the cause, then leave the case to nature; for she is a skillful physician, and will cure nine-tenths of all these case unaided, which is far better than the physician will do whose prescriptions have no reference to the cause. He may occasionally succeed in giving assistance, for he may happen now and then to meet with a case *adapted to his treatment*; but who would not rather trust the skill of nature, than be placed in the hands of such a "doctor"?

Where the dysentery *results from cold*, the patient should be placed in bed, and such simple means employed, as may be at hand, and adapted to promote free perspiration. The compound tincture of Virginia snakeroot is about all that will be found necessary to be given internally in most cases. As an adjuvant, a sinapism or hot fomentation may be applied to the abdomen, especially over the principal seat of pain. If the pain is severe, a small dose of morphia may be given; or what is better,

especially if the motions of the bowels are frequent, an injection of starch and laudanum may be administered, and the patient requested to retain it as long as practicable. This should be repeated after every discharge. Or a pill of opium may be introduced as a suppository into the rectum; and repeated when it comes away. This is more likely to be retained and control the tenesmus than either of the other modes of administering opiates.

On the other hand, if the disease is produced by the presence of *irritating substances* in the bowels, the first indication is their removal; and for this purpose no remedy is better than comp. powd. of rhubarb. This should be prepared by adding about half an ounce to a pint of boiling water, and after steeping some minutes, strained and sweetened; and given in wineglassful doses every second hour until the cathartic effect is produced. As a substitute for this, I have found half a grain of podophyllin combined with two grains of leptandrin to answer an excellent purpose. This should be repeated once in four hours until it produces a free action of the bowels. When this is accomplished, if the symptoms do not subside with the aid of the sinapism and fomentations, to be used simultaneously with the exhibition of the cathartic, it should be followed by suitable doses of morphia and ipecacuanha to relieve the pain and promote diaphoresis, or our diaphoretic powder may be given. Where the discharges are frequent and the tenesmus great, the starch and laudanum enema, or opium suppository should be employed after each movement of the bowels. I was accustomed in former times to give very frequently, in these cases, as a cathartic, comp. powd. of jalap with raspberry leaves made into a decoction. This is a very safe, efficient and active cathartic, and where convenience or other circumstance suggest a substitute for the agents above mentioned, I should now employ it. The raspberry leaves appear to prevent griping, and they act as a mild astringent without in the least irritating the bowels.

You should in no case of this kind overlook the importance of revulsive measures, such as the sinapism and hot fomentations to the bowels. They are means always at hand, and as they are highly corroborant to the radical remedies, should never be omitted. Mucilaginous drinks should be used to satisfy thirst, not only because of their adaptation to that object, but because of the soothing and sheathing effect which they have on the irritated mucous membrane. Their use is highly important. The bark of

Ulmus fulva, or the root of *Althæa officinalis* is all that need be desired for this purpose.

Where there is derangement of the stomach in the early stage, as indicated by nausea and vomiting, it will be well to premise all other treatment by the full operation of an emetic. This will exert an important influence on the subsequent course of the disease, and is a highly commendable measure; for if you undertake to remove accumulations from the stomach by cathartics, it may require two or three days to accomplish the object; but a brisk emetic removes them at once, and prepares the way for a more efficient action of your cathartic. The emetic so frequently referred to (the lobelia and eupatorium), I regard as equally adapted to this case. I have sometimes administered the following as an emetic:

R. Ipecac.,
Lobel. pulv., *āā* ʒij.
Capsicum pulv. gr. vj.
Water, Oj.

Decoct and strain. Sig. Give a gill every ten minutes till free vomiting occurs.

I very much dislike all powders containing indigestible, woody matter, for they are apt to adhere to the surface of the mucous membrane, and keep up an irritation long after you desire the action of your medicine to cease. I have no objection to the administration of soluble powders in substance, but as a general rule, where a tincture, infusion, or solution can be used, it is preferable.

In preparing starch for an injection, it should be made somewhat thinner than when used for ordinary purposes. Instead of starch, any other mucilaginous fluid, as the infusion of slippery elm, or of marsh mallows may be used. The quantity used at a time should not exceed a gill, with a drachm of laudanum, and whether the injection is employed or the opium suppository, it should in either case be repeated as frequently as it passes away; for by neglecting this, the disease will get a start of you which it may be difficult to regain.

If you are called at a late period to a case of sporadic and uncomplicated dysentery, and find the bowels in a soluble condition, as is usually the case, or after the action of your first course of medicine you have brought about this condition, but find that the

disease does not yield, you must hold a gentle though firm and steady hand. Do not thunder away now with your heroic measures as if resolved to kill or cure at once. You may possibly cure some, but you will by such a course send many more to the grave. The cause being removed, if the inflammation does not subside, it is because it has reached a point at which it has become an independent or self-sustaining disorder. Under such circumstances you should employ no active purgatives, but rely upon mild and gentle means. The question then arises, what are our remedies in such cases? On this point there is great diversity of opinion. I have seen excellent effect from small doses of the compound powder of rhubarb, repeated sufficiently often to keep up a gentle action of the bowels; but I think I have seen still better results from the use of pure salad oil for the same purpose. This may be given in doses of from one to four teaspoonfuls once in two hours, and may be relied upon as the only aperient necessary. With either of these aperients it will be necessary to administer some soothing adjuvant, for which purpose the compound powder of ipecac. and opium is a very good article. It determines to the skin, and while it does not irritate the bowels, it tends to restrain the desire for frequent evacuations which so much distresses the patient, and aggravates the disease. It may be given in 10 grain doses, as often as necessary to maintain its anodyne influence. In connection or in alternation with this, an injection may be given two or three times a day, prepared as heretofore directed, or the opium suppository may be used instead. As a change in the character of the injection I have used with advantage, a mild solution of tannic acid combined with tincture of opium. Or instead of the tannic acid, an infusion of raspberry leaves, or of oak bark may be employed, especially if there is diarrhea. These means may be repeated as circumstances require.

Where there is reason to believe the dysentery is caused by *worms*, as is frequently the case in children, your course is plain; all you have to do is to remove the worms. Some simple palliative means may be used to relieve the urgency of the symptoms, but the main reliance should be on adequate vermifuge treatment.

But the most important form of this disease is that in which it prevails as an epidemic, and especially where associated with malarial influence, as it almost invariably is in this country. Where this is the case, I need scarcely say what my views of treatment are. I have so often insisted on the importance of

removing malarial disease in the start, wherever it is found to be recent, either as a primary or secondary affection, that you can be in doubt as to the course I should pursue under such circumstances.

I take to a case of dysentery occurring under malarial influence. I should seek of course to learn all the history and peculiarities of the attack as in other cases, and should adapt my prescriptions to those peculiarities; but for the arrest of the malarial fever, which is usually the paramount disorder in such cases, I should rely upon nothing but the quinia and iron. If the best time for the administration of these remedies was not present, I should premise their exhibition by such palliative measures as have been recommended in other cases. I would move the bowels if they were torpid, and stimulate the liver if that gland was inactive, by such aperient or cholagogue medicines as the compound powder of rhubarb in the one case, or the podophyllin and lepecandrin in the other. If the stomach were evidently deranged by accumulations I would empty it by an emetic as in cases before mentioned. The action of such agents where their use was indicated would, without doubt, render the system more susceptible to the influence of the antiperiodic remedies, but harm produced by a single exacerbation of fever would far overbalance all their beneficial effects. If therefore a remission were present, or the time when one might have been expected had come, whether the febrile symptoms had subsided or not, I should first of all give efficient doses of quinia and iron.

The administration of the antiperiodic medicine is not however incompatible with the application of the sinapism and fomentations with the use of diaphoretic medicines, such as morphia and ipecacuanha, diaphoretic powder, or sudorific tincture; nor with the employment of mucilaginous injections with laudanum or the opium pill as a suppository. Indeed, these various measures can never be out of place in dysentery in any form, and although merely palliative in cases of the kind under consideration, that is, incapable of affecting a cure so long as the malarial poison is acting upon the nervous system; yet they are so highly corroborative, and tend so much to mitigate the sufferings of the patient, that they should in no case be omitted.

This disease prevailed very greatly within the field of my practice last season, and all the cases which fell under my observation were impressed with the periodic feature; some indeed were dis-

tinctly intermittent in their character. I treated them in the manner just described; came right in with my antiperiodic medicine, unless the patient was in the height of an exacerbation when first seen, and in almost all cases thus treated, I was saved the necessity of giving either an emetic or cathartic. I do not say this will always be the case, but I have generally found the bowels to resume their proper motions, or at least become more tractable under mild aperients, after the system was brought under the influence of the antiperiodic remedies. Such was my course in the epidemic of last year, and while the disease was carrying off persons in every direction, I have the satisfaction of knowing that not a patient to whom I was called died.

I do not entertain the least doubt of the correctness of my views of this disease, namely, that the fever is the principal difficulty, and the dysentery a mere *epidemic* feature of it. You will indeed find a concession to this effect in some of the more recent authorities. Dr. Wood says that "dysentery is a mere attendant on the fever in this case," and that the colitis, in some severe and obstinate cases, ceases "almost immediately when the prop which supports it is removed." Still he does not recommend the use of quinia until "an intermission, or a regular remission, with only so much general action in the interval as may be supposed to be sustained by the local disease" has been obtained, and then only "after a thorough preliminary evacuation of the bowels, and the loss of blood, if that be deemed necessary." The Doctor certainly does not conform his treatment to his own philosophy. No one denies that the cause should be removed. If accumulations are the cause, the bowels should of course be evacuated; if an excess of blood in the system be the cause, a part of it should be lost; (though I would suggest that there are ample openings provided for this purpose by nature, rendering the lancet unnecessary), but if malarial fever be the "prop" why not "knock out that prop," to use a common phrase, by the only appropriate or efficient means, an antiperiodic prescription. If it is replied that the quinia is more efficient after a cathartic, I reply, it is equally true that a cathartic will operate much better after the administration of the quinia; and I see no reason why the radical measure should be delayed at the expense of valuable time, to await the action of a mere adjuvant. On the contrary, having for a dozen years treated this disease upon the very doctrine now beginning to be recognized, I can assure you that what reason and analogy in this case so

no fecal or bilious matter, a pill should be given composed of podophyllin one-fourth of a grain, leptandrin one-half a grain, extract of taraxacum a sufficient quantity, and repeated once in twelve hours until the dejections become bilious.

It need scarcely say that the *diet* throughout the treatment must be simple and light. Attention to this is the more important as it is sometimes an appetite, which if indulged, would soon convert a moderate case into one of great severity.

Convalescence must be managed with great prudence. The patient should keep within doors much longer, generally, than he would be necessary, and when he begins to take exercise he should do so very gradually, being careful not to fatigue himself, nor be exposed to cold or dampness, nor sudden atmospheric changes.

He should continue to be restricted to plain, digestible, unstimulating food: and his bowels should be kept in a soluble condition by the occasional use, if necessary, of a pill of podophyllin, leptandrin, and extract of taraxacum.

strongly suggest, is by experience demonstrated to be sound philosophy.

But a case will occasionally occur, which will not be so easily managed. There may be some peculiarity in the constitution of the patient which you have not discovered, which renders the disease uncommonly obstinate; or you may have been called after the disease has been allowed to progress too far; or after it has received such an impulse by improper treatment that ordinary measures prove incompetent to arrest it; or your failure may be owing to some influence for which you may not be able to account. In any such case you will have your skill and judgment put to a severe test.

Where the inflammation was very extensive, I have derived much advantage from the application of a few cups along the track of the colon before and behind. In connection with this measure I have given a pill of nitrate of silver $\frac{1}{4}$ gr. finely pulverized and mixed with two grs. pulverized gum Arabic moistened with water, and repeated it every three hours; while the bowels were kept restrained by a pill of opium 4 grs., surrounding a solid piece of nitrate of silver $\frac{1}{4}$ gr., introduced into the rectum as far as practicable with the finger. The opium pill should be repeated whenever it comes away, in order to keep the system freely under its influence, and thus subdue more permanently the spasmodic action of the bowels. The nitrate of silver pills should be continued for twenty-four or thirty-six hours and then suspended, when they will usually have relieved the capillary congestion so commonly present both in the skin and mucous membrane of the bowels, and will be followed by free bilious evacuations. During the use of these pills, it should be observed, most other medicines should be suspended, as they have a wide range of incompatibles. Little or no salt should be allowed while they are being given, as it would decompose the nitrate of silver.

I have seen but one or two cases where the injections or the pill would not, after some perseverance, be retained and restrain the discharges, and in these cases I gave by the mouth a pill of two grs. of opium surrounding one of the pills composed of nitrate of silver and gum Arabic. This seemed to have the desired effect, and by repeating the opium sufficiently often to keep the system under its influence, say once in four to six hours, I was able to relieve the spasmodic action of the bowels.

If the dysenteric discharges continue notwithstanding these pills,

with no fecal or bilious matter, a pill should be given composed of podophyllin one-fourth of a grain, leptandrin one-half a grain, and extract of taraxacum a sufficient quantity, and repeated once in twelve hours until the dejections become bilious.

I need scarcely say that the *diet* throughout the treatment must be very simple and light. Attention to this is the more important as there is sometimes an appetite, which if indulged, would soon convert a moderate case into one of great severity.

The convalescence must be managed with great prudence. The patient should keep within doors much longer, generally, than he thinks necessary, and when he begins to take exercise he should do so very gradually, being careful not to fatigue himself, nor be exposed to cold or dampness, nor sudden atmospheric changes. He should continue to be restricted to plain, digestible, unstimulating diet; and his bowels should be kept in a soluble condition by the occasional use, if necessary, of a pill of podophyllin, leptandrin and extract of taraxacum.

LECTURE XXVIII.

LOCAL DISEASES—CONTINUED.

Chronic Dysentery: Symptoms; Constitutional Derangement; Post-mortem; Cause; Treatment—Mild Cases—Ulceration—Diarrhea—Varying Remedies—Prolapsus Ani—Diet. Peritonitis, or Inflammation of the Peritoneum: Preliminary Remarks; Varieties; Acute; Symptoms; Puerperal; Tympanitis; Periodicity; Post-mortem; Cause; Diagnosis; Prognosis; Treatment; Chronic Form; General Remarks; Symptoms; Treatment; Clinical Case of Low Fever.

CHRONIC DYSENTERY, ETC.

Chronic dysentery is not a very rare disease. Either associated with some other affection or in its uncomplicated character, it is perhaps as frequently encountered by the practitioner as any other disorder. It is generally connected with chronic enteritis, as the irritating evacuations incident to the disease of the small intestines can scarcely fail to propagate such disease downward into the large intestines; and even where the original disease is dysentery, the inflammatory condition, when protracted into the chronic form, is very often extended, not only throughout the colon, but to the small intestines also. It is therefore not at all uncommon to have a union of the symptoms of chronic enteritis, with those of chronic dysentery.

I shall give you merely a general outline of the *symptoms*, without dwelling upon them at great length. The skin is always more or less inactive in this affection, being generally very dry, parched and husky, owing to inactivity of the capillary circulation. The bowels are usually loose and irritable, unless the lesion is confined to the lower portion, in which case they are generally costive. If the small intestines are involved in the chronic inflammation there will be a constant tendency to diarrhea. The discharges may not be more frequent, but their character will be very different from that of the purely dysenteric discharges, where the lower bowels only are diseased. The frequency in either case is exceedingly

variable, depending no doubt, on the intensity of the diseased action, the constitutional condition of the patient and his habits in regard to diet, exercise, etc. In some there will be but two or three motions of the bowels in twenty-four hours, in others they will number as many as twenty or thirty and sometimes more.

In simple chronic dysentery the discharges are generally very small, consist chiefly of mucus, or that and blood, and are attended with tenesmus. When feculent matter is discharged, it has generally, the consistency of ordinary alvine evacuations, but will either be surrounded by a coat of mucus and perhaps streaked with blood, or else the morbid excretions will be found involved between layers of fecal matter. If the liver is torpid there will be constipation and diarrhea alternately, with clay-colored dejections; but the liver may become over excited and the discharges assume an acrid bilious character, and unless corrected, increase the disease, or at least its most distressing symptoms—the tenesmus and tormina. Prolapsus ani is often a result of the spasm of the muscular coat of the rectum, especially in children.

There are generally symptoms of *constitutional derangement*, except in very slight cases, as evinced in the condition of the skin above described, an accelerated pulse, and a slight fur on the tongue. These symptoms with all others pertaining to the case, will of course be modified by the intensity, extent and complications of the morbid condition.

The *post-mortem* appearances exhibit the usual indications of chronic inflammation, redness, thickening and very often ulceration. In cases of some standing, unmistakable cicatrices may sometimes be observed, while other ulcers may be seen in every stage of progress. The small intestines and stomach in fatal cases, usually become involved also, though sometimes little or no traces of lesion are found in them. The liver is often found to contain abscesses, or to be otherwise affected according to the nature and extent of its implication in the morbid condition.

Of the *cause* of this affection it is scarcely necessary to speak, since it is usually a consequence of the acute form. It sometimes, as has been stated, results from chronic enteritis; it is not unfrequently a sequel of typhoid or other low fevers, and it may to a limited extent, be produced by an extension of hemorrhoidal inflammation.

The *duration* of the disease has of course no natural limit, except that of life itself, and mild cases seem to have little influence upon

the general health. But where the disease extends to any considerable distance in the bowels, its tendency is constantly to undermine the constitutional vigor, until the vital powers finally give way and the patient sinks into a low hectic condition, marked by great emaciation and nervous excitability, and finally yields to his fate. Proper treatment however, employed before the general health is entirely destroyed, will seldom fail of restoring the patient to a healthy condition.

In the *treatment* of chronic dysentery we can not be guided by a knowledge of the cause as in the acute disease, for whatever may have been the original difficulty, that may be supposed, in most cases, to have passed away, and the disease under consideration is a morbid condition of the parts from which, through local or general debility, the system has been unable to relieve itself. Nevertheless, if there is an existing cause operating to perpetuate the disorder, it should certainly be removed.

If the dysentery is confined to the *lower part* of the bowels, with the usual symptom of costiveness in such cases, your main reliance will be in mild aperients. To fulfill this indication, I know of nothing better than the compound powder of rhubarb, which will not only increase the activity of the bowels, but correct any morbid secretions. I usually combine with this medicine a gentle tonic, as the wild-cherry bark, which operates as a sedative as well as a tonic. This prescription should be repeated often enough to secure one or two alvine evacuations every day. The same medicine will be highly beneficial also where there is diarrhea, for the rhubarb always leaves behind its aperient action an astringent effect, which with the cinnamon, will do much to restrain the bowels when too loose; but if it should prove insufficient, some efficient astringent may be combined, or alternated with it.

You will frequently find patients who while laboring under chronic dysentery, will attend to daily business, and during the excitement of the day, experience very little disturbance; but when evening arrives and they become quiet, the dysenteric discharges set in and cause more or less trouble and distress during the night. In these cases a dose of the diaphoretic powder, on going to bed at night, will quiet the irritation of the bowels, and moisten the skin, by determining the circulation to the surface. As a substitute for this, a small mucilaginous injection containing laudanum may be employed, where the irritation is merely local; but as it has not the diaphoretic influence of the other prescrip-

tion, it is not so useful where there is a dry skin and some general excitement.

Where the character of the evacuations and the other symptoms palpably evince *ulceration* of the mucous membrane, I have given a pill composed of one-eighth of a grain of nitrate of silver inclosed in gum opium. This will usually pass through the stomach and upper bowels before the opium is dissolved, and then the caustic will act directly upon the ulcerated surface.

In connection with all other measures in the treatment of chronic dysentery, and under all circumstances, particular attention should be given to the condition of the skin. The direct sympathy existing between the cutaneous and mucous surfaces, heretofore so frequently adverted to, renders this indication highly important in the treatment of chronic dysentery. Bathe the surface night and morning with broke water and spirits. This tends to quiet irritability, and if followed by the diaphoretic powder in the evening, will very generally secure a comfortable night's sleep. It also favors the removal from the system of morbid accumulations, by opening the pores of the skin, and promoting the healthy discharge of its functions.

Where there is *obstinate diarrhea* in connection with the dysenteric symptoms, it will become necessary, as was before stated, to employ more astringent remedies in addition to those already mentioned. Here the marsh rosemary will be found of great service, though in its absence any of our unirritating astringents may be employed, such as the geranium, blackberry, etc. As a substitute for the diaphoretic powder, I have under such circumstances, sometimes given equal parts of comp. tinc. of catechu and paregoric in moderate doses, with good effect. But where there is constipation, positive astringents should not be employed, for they will tend to increase it without relieving the dysenteric symptoms.

Chronic dysentery will not yield at once to any mode of treatment, but requires patience and perseverance to effect a cure. You will find it often necessary after having *employed certain remedies for a while to substitute others*, not only because you desire to satisfy the anxiety of your patient, but because medicines when employed for some time actually cease to have their ordinary influence, owing to the system's becoming insensible to their influence, through habit. In addition to the articles already mentioned, I will name the decoction of raspberry leaves, which may be given in doses of a wineglassful twice a day. It is an excellent astringent,

though mild and soothing to the mucous membrane. Where astringents by the mouth, are contra-indicated by constipation, they may be used in the form of a mild infusion as enemata. A weak decoction of oak bark for instance administered in this way, may be of much advantage. Where there is extensive gastro-intestinal irritation, the infusion of ptelea, which I have so frequently recommended for that condition, will prove a valuable tonic, while it seems really to allay irritation.

I stated while speaking of symptoms, that *prolapsus ani* frequently occurs in chronic dysentery, especially with children. I have frequently met with this occurrence, and as it is one which always gives much distress to the little patient and alarm to the parents, and is withal sometimes difficult to relieve, it may occasion some trouble and embarrassment to the inexperienced practitioner. I will therefore briefly state the method which I have always pursued with success. The phenomenon is merely a turning out, or protrusion of the mucous membrane of the rectum, which is retained in this position by the spasmodic contraction of the sphincter ani muscles. When it first occurs, it exhibits a red tumor of greater or less dimensions, and if allowed to remain long, the color will be changed to a dark purple or livid hue. In some cases the gut is easily returned, and the mother or nurse, if properly informed, will have no difficulty in doing it. But sometimes it presents a case of much difficulty, and I have been called to cases where the efforts of friends and physician had failed. The means I have found always successful are very simple. Oil a piece of soft linen, lay it upon the tumor, and press it with the finger into the intestine. If this be done gently but firmly, the sphincter will relax, and the intestine will pass in with the finger and linen. The finger must not be withdrawn at once, but you should wait until you feel the sphincter contract upon your finger and then carefully withdraw it, and remove the linen. To prevent a recurrence, a compress, consisting of several folds of linen oiled and applied to the anus, may be retained there by means of a T bandage. The bowels should be kept in a soluble condition, while soothing astringent or anodyne injections should be employed to overcome the local irritation and tenesmus. Where the prolapsus depends upon debility and relaxation of the bowels, daily bathing the abdomen and loins with a decoction of oak bark, and letting the patient take a "sitz" bath of the same, will have a tendency to overcome the difficulty.

The *diet* is of great importance in the management of chronic dysentery; and on this subject I refer you to what was said under the head of indigestion. The directions there given are perfectly adapted to the present case. A mild, unstimulating diet, easily digested, and in moderate quantities, should alone be allowed.

I omitted to mention a remedy while speaking of diarrhea, which, I am confident from the trials I have made with it, is of great value in that affection. I have found it equally useful in diarrhea connected with chronic dysentery, and am anxious to see its virtues thoroughly tested. It is a plant called in botany *Rochelia Virginiana*, and is a species of the *stick tight* or *beggars' lice*. The root is spindle-shaped, but thickly set with small rootlets; it has a peculiar but very bitter taste, and when chewed, is nearly all converted into mucilage in the mouth. I have seen cases of diarrhea depending on relaxation, and others connected with chronic dysentery, relieved at once by the patient chewing and swallowing a piece of this root not an inch long, and the daily use of it appeared to overcome obstinate diarrhea. Still I have not sufficiently tested the agent to make it a leading article in my treatment. To enable you to recognize it I will give you a description of the plant. The root as above stated, is spindle-shaped, with many small fibers, and has a darkish color. It is biennial, and is only fit for use the first year, being woody the second. Lower leaves, broad ovate, subcordate, acuminate, scabrous and dark green above, pilose and lighter colored below. Racemes divaricate, axillary; fruit covered with hooked bristles; upper leaves, lance oblong. The plant does not send up a stem the first year, but forms a spreading tuft of broad, dark green leaves. In Eaton's North American Botany this plant is called an annual, but this is a mistake.

PERITONITIS, OR INFLAMMATION OF THE PERITONEUM.

Having occupied as much time on inflammation of the mucous surface of the bowels as can be allotted to that part of our subject, we will pass to the consideration of peritonitis, or inflammation of the serous membrane of the abdominal cavity. This membrane, as you are aware, lines the parietes of the abdomen and affords a covering, more or less complete, to all the abdominal and pelvic viscera. It is therefore in very intimate relation with the intestinal canal, and with several other organs in this region, into which we have yet to pursue that form of disease which is now occupying our attention.

As a primary or independent affection peritonitis is rarely met with, but as resulting from wounds or other local injuries, and as associated with puerperal fever, and with malarial and protracted cases of typhoid fever, this form of phlegmasia may, upon the whole, be regarded as somewhat frequent in occurrence.

Peritonitis is susceptible of the usual distinctions—*acute* and *chronic*—but the line of demarcation between the two forms is so indistinct, that but little advantage can be anticipated from their separate consideration. Our attention will first be directed to the acute form, after which a few words will suffice for all I have to say in regard to the other. Some authors have made other divisions in treating of peritonitis, having reference to the precise locality of the inflammation. In this way Cullen made three species, namely, *peritonitis propria*, *peritonitis omentalis* and *peritonitis mesenterica*. Others distinguish several varieties, depending upon the location of the disease or the particular viscus whose serous covering is the seat of inflammation. But such distinctions are of no practical importance and I shall not observe them. I shall however, have occasion to describe several modifications or varieties of the disease as produced by different causes or occurring under peculiar circumstances. The symptoms of peritonitis proper do not however, materially vary, except perhaps in severity, whatever may be the origin of the inflammation or its complications, though they may of course be associated with and modified by the symptoms of attendant affections.

ACUTE PERITONITIS.

This disease is most frequently encountered in practice, in that variety denominated *puerperal peritonitis*. The condition of all the organs at the termination of the period of gestation, and the debility resulting from the relaxation of the tissues, and the collapse of the parts, which must follow parturition, seem strongly to predispose them to inflammatory action; and the serous covering of the body of the womb can not but partake of the common tendency. Here we have a striking illustration of the principles which I have attempted to impress on your minds, as involved in the phenomena of inflammation. We have here a combination in many cases, of the two proximate causes of inflammation;—a relaxation of the vessels and an impoverished state of the blood.

The general *symptoms* of peritonitis will now be briefly stated. It generally comes on suddenly without much premonition. The

first symptom is often a very severe, sharp pain in the abdomen, usually in the hypogastric region. Or a slight chill may precede the pain. When the patient is in childbed some slight indiscretion may suffice to bring on an attack. She may for instance, after lying for a while under too much covering, become uncomfortably warm, when a sudden removal of the bed-clothes exposes her to the cool atmosphere; a slight chill is the consequence, and this is either accompanied or soon succeeded by the pain evincing peritoneal inflammation. This is not always the result of exposure under such circumstances, but where there is a predisposition to the disease such exposure may be sufficient to develop it.

There is a form of *puerperal peritonitis* supposed by most authors to be highly contagious; and it becomes a matter of great consequence to know whether it is really so or not, as connected with the lives of patients and the reputation of the practitioner. If it could be clearly shown that the disease is contagious, and liable to be conveyed from patient to patient by the medical attendant, a plain course of duty would be presented to him as a conscientious man, namely, to avoid for a time all obstetrical practice, after having attended a case of this description. I have very great doubt however, as to the contagiousness of the disease. I have never seen any thing sufficiently conclusive to convince me that there is any contagion connected with it.

Where the case commences with a *chill*, this is immediately succeeded by decided febrile reaction, attended by the symptoms of local inflammatory disease. The skin gradually becomes hot, and the pulse frequent, small, hard and wiry. The frequency of the pulse is peculiarly diagnostic, for in ordinary inflammatory diseases the pulsations seldom exceed 100 per minute, while in peritonitis they range from 110 to 150. The urinary secretion is diminished in quantity and of a higher color. The tongue is covered with a slight coat of a white or yellowish hue. There is always tenderness of the abdomen, which may however, be more manifest in some particular place, corresponding with the locality of the inflammation. If the disease is located on the stomach, the tenderness will be most distinct in the epigastrium, if on the liver, in the right hypochondrium and so of other organs. But wherever the inflammatory action may be first developed, there is a tendency to its diffusion throughout the whole extent of the membrane. The whole abdomen thus becomes exceedingly tender to the touch, and even the slightest motion is the cause of pain;

so that patients are usually inclined to lie perfectly still, and generally on the back, with the lower limbs drawn up, to prevent tension of the abdominal muscles. The effort of coughing, sneezing, vomiting or defecation, in short any action requiring contraction of the abdominal muscles, occasions suffering. To avoid pain, patients will frequently postpone as long as possible the evacuation of both the bowels and bladder. Even the motions necessary to natural respiration are sometimes the cause of so much pain, that the patient breathes with the thoracic muscles alone, even suspending as far as possible the contraction of the diaphragm. I have never recognized the hurried breathing described by some writers, but the inspirations are short, and the respiration has a kind of panting character. Sometimes a slight sound will mark every expiration. This is often the case also with children, where there is inflammation of the bowels, and the difficulty of breathing is sometimes referred to disease of the lungs; but it is very easy to distinguish between this panting, grunting respiration, and the hurried breathing characteristic of pulmonary inflammation.

The abdomen is usually *tumid* or *swollen* at an early period of the disease, and sometimes decidedly tympanitic, though tympanitis proper is more commonly a symptom of the advanced stage. The tension of the abdominal parietes which attends the commencement of peritonitis, may usually be somewhat relieved by an evacuation of the bowels, but the tumefaction and tympanitis which subsequently exist, will persist, notwithstanding there may be constant diarrhea. There are however, occasional cases where a distended condition of the abdomen is not present; the abdominal muscles being contracted down so as to give the abdomen a flat or even concave appearance.

When the inflammatory action has its principal seat in any *particular locality*, the fact may generally be ascertained and the extent of active disease determined, by the pain felt under pressure with the hand; especially if the patient is of a spare habit. If the epiploon is the special seat, the tenderness will extend, it is true, over the fore part of the abdomen to some extent; but it may be known by the fullness in the middle of the abdomen, and, when there is effusion into the folds of the omentum, by the inequalities resulting from the filling of circumscribed sacs, which will be felt as distinct tumors of various sizes on the surface. When the disease results from an impacted condition of the colon, as it sometimes does, a circumscribed tumor may be felt in the location of

the difficulty. This is probably most commonly the case at the head of the colon, in which case the pain and swelling will both commence in the right iliac region, and be most manifest there perhaps, throughout the course of the disease. But it may originate from this cause at any other point in the course of the large intestines. I remember a case, in which there was a generally diffused inflammation of the peritoneum; but from the history of the case, as well as present symptoms, I concluded the disease originated and still had its principal seat in or about the left hypochondrium, and judging that it resulted from obstruction in the colon, I evacuated the bowels thoroughly. The result was an immediate subsidence of the local symptoms, and the speedy disappearance of those of a general character. Nausea and vomiting are generally regarded as denoting the involvement of the gastric portion of the peritoneum, either by its originating there or having reached that part by extension. Where there is congestion of the liver however, these symptoms may occur from that cause, even though the serous surface of the stomach is unaffected. It will therefore be necessary to ascertain whether there are diagnostic symptoms of hepatic engorgement, not only with a view to the determination of this point, but also to the indications of general treatment. If the vomiting or nausea depend on biliary derangement there will be a loaded tongue, but when they depend on gastric irritation, the tongue will be red and irritated as heretofore described; but where there is no disturbance of the stomach, the tongue will present a thin white coat and be in a moist condition. Irritation of the stomach is often a troublesome attendant of peritonitis. It interferes with the operation of the medicines necessary in treatment, and I always look upon it as one of the most unfavorable circumstances likely to be connected with peritoneal inflammation.

Constipation is a uniform symptom of peritonitis in the earlier part of its course, whether it is the parietal, the visceral or epiploic portion of the peritoneum that is specially involved. But in protracted cases the mucous surface of the bowels becomes involved, by sympathy, and then diarrhea generally appears. This too, may be regarded as a very formidable symptom.

Periodicity is a symptom which often attaches itself to this disease. I have found a large majority of the cases of peritonitis, to which I have been called, to be more or less modified by malarial influence. In calling attention to this fact, in relation to this disease as well as to others, my object has been, and still is, to impress your minds

with facts gleaned from long experience. While speaking of the general principles in relation to malaria, and its effects on the human constitution, I announced its great tendency to impress its influence upon nearly every disease to which man is liable, and in adverting to this point in relation to individual diseases, I am merely reiterating and illustrating that tendency. Should the frequent reference which I make to this interesting fact, lead any to charge me with riding it as a "hobby," be it so; I shall nevertheless endeavor to perform what I conceive to be my duty. The symptoms of the malarial complication you will not be at a loss to recognize, and its treatment will not differ from that required for remittent or intermittent fever.

The *post-mortem* phenomena are such as might with reason be expected. Effusion is often found either generally diffused through the sac, in the folds of the epiploon, and in the folds of the mesentery, or connected with the convolutions of the small intestines. Adhesions between portions of the peritoneum are often found, and sometimes sacs or small isolated pouches of serous membrane are formed in this way; which being filled with the liquid effused, explain the nature of tumors that have been observed during life. The effusion is sometimes yellowish and watery in appearance; and sometimes curdled and milky. Where the disease has been very rapid, so that death has occurred at an early period, a considerable degree of redness will designate the parts immediately involved, and this will constitute the only pathological change observable; but where the case has been protracted, collections of coagulable lymph, sometimes forming partially organized membranous tissue, are found between opposite surfaces of portions of the peritoneum. This substance has indeed been found sometimes actually to contain nerves and blood-vessels in its structure. This produces adhesions of greater or less extent, and forms occasionally the distinct sacs spoken of a few moments ago. Where the disease has resulted from perforation of a viscus, the fact will be indicated by the character of the contents of the peritoneal cavities. In that case also gas of more or less fetid character will escape when the first incision is made through the abdominal wall.

In regard to the *cause* of this disease, I need only recapitulate what has been already said. The most common cause is exposure to sudden changes of temperature, especially where there exists a predisposition, from constitutional peculiarity or debility and an impoverished state of the blood, or from injury to the membrane

resulting from parturition, etc. Malarial fever also may develop this form of local disease where there exists a predisposition to it. It sometimes arises from disease within the intestinal tube, as when inflammation of the mucous membrane of the stomach or bowels extends to the other coats; when an ulcer perforates the intestinal wall; or when there is obstinate obstruction in the bowels from hardened feces, from strangulation or from intussusception. Inflammation of the body of the uterus is sometimes extended to its serous covering; so also of the ovaries; of the mucous and muscular coats of the bladder; of the substance of the liver, or spleen, etc. Peritonitis is sometimes the result of local injuries, such as wounds and bruises; and of surgical operations for strangulated hernia, tapping for ascites, etc.

The *diagnosis* in this disease is not generally attended with much difficulty, unless by reason of complications. The only diseases with which it is likely to be confounded are colic, gastritis and enteritis. From colic it may usually be distinguished by the absence of the peculiar paroxysmal pains of colic; by the low grade of continuous pain experienced in peritonitis; by the greater frequency of the pulse in this disease than in colic; by the extreme tenderness of the abdomen in peritonitis; by the peculiar distress and anxious expression of the countenance, and by the indisposition to move, where there is peritoneal inflammation; while in colic there is constant restlessness and changing of position. It may be distinguished from inflammation of the *mucous* surface of the alimentary canal, by the tendency to constipation; by the absence of mucus, serum, and blood in the discharges; by the sharper pain, the greater tenderness under pressure, the fullness and tension of the bowels; and by the low grade of the constitutional symptoms, as observed in the frequent, feeble pulse and nervous depression. From rheumatic and neuralgic affections, the above diagnostic symptoms will be all-sufficient to enable any intelligent physician to distinguish this disease.

The *prognosis* is not generally unfavorable under judicious management. Although the disease is generally rapid in its course, and when very severe tends to a speedy fatal termination, it is nevertheless as amenable to prompt and appropriate remedies, as any other form of inflammation, and hence it does not often prove fatal in the hands of a skillful physician. When there is a tendency to a fatal result, the pain mostly subsides, the pulse becomes more rapid and feeble, and the skin cool; slight delirium occurs

which results in a comatose condition; hiccough perhaps ensues, which is a most formidable symptom, and is soon followed by death. Where the tendency is favorable, an opposite train of phenomena will of course be developed. The pulse becomes less frequent and fuller; the skin acquires more natural warmth, a free and healthy perspiration appears on the whole surface, the flow of urine increases, and deposits a sediment common to the declining stage of inflammatory diseases. This is a highly favorable prognostic symptom. The deposit will usually be either phosphate of lime or uric acid.

In speaking of the *treatment* of peritonitis, I shall not dwell on the course recommended in the authorities. Among them there is perhaps as much concurrence in the treatment of this as of any other disease. Bleeding appears to be looked to as the only hopeful measure, and from the unanimity with which it is recommended, I should be inclined to regard it with more consideration than I do, were it not for two or three facts. The first fact is this, that under the blood-letting treatment the disease has always been attended with a melancholy fatality; a second fact is, that under a different course, such as I shall soon present, the disease is seldom fatal, and a third fact is the notorious change that is taking place in the practice of even the old-school physicians in regard to this mode of treatment. I might here also refer to the general principles, established in regard to the loss of blood, as favoring rather than relieving inflammatory action; and remark that however plausible the opinions of the advocates of blood-letting may be rendered by the mode of their presentation, and however respectable the names of those advocates may be, we should certainly suspect some gross error, when we find a demonstrated fact in natural philosophy standing in stern opposition to human opinions. I feel confident that when you shall have thoroughly examined this subject, you will find that peritoneal inflammation does not furnish an exception to the general rule to which I refer.

The cause of the disease is, of course, a subject of much importance in this as in other forms of inflammation. Where there are accumulations in the stomach or bowels or both, they may be the cause, and their removal may promptly relieve the case; but if these are not the cause they should be removed, as they will tend to aggravate the symptoms and prevent a cure. A prompt emetic, if indicated by the condition of the stomach, will be of much use, besides the local relief afforded by it, in equalizing the circulation, and arousing the secretions. And here the infusion of lobelia and

boneset will prove to be admirably adapted to the indications. For the evacuation of the bowels you will need a thorough cathartic. For this purpose I am in the habit of employing the compound powder of senna and jalap, to which I add a small quantity of podophyllin. Where there is an impacted condition of the colon, the action of the cathartic may be very advantageously promoted by a laxative enema. The action of a cathartic under such circumstances is highly beneficial, as it not only unloads the bowels and removes the cause where the disease has this origin, but by its stimulating effect on the mucous surface, it acts as a revulsive measure, relieving at once, in many cases, the inflammation of the serous membrane. The medicine I have recommended for this purpose will also act upon the liver, and relieve or prevent hepatic torpor and consequent portal congestion. The measures I have recommended are manifestly, as you will perceive, adapted to all cases where there are accumulations in the alimentary canal.

If the disease results from cold, a free and copious perspiration should be induced. If indicated, the measures just advised will tend to promote this object, while other means may be employed at the same time. But where it is not deemed best to give an emetic or cathartic, the object may frequently be effected by simple diaphoretic teas. If however these are not sufficient, the compound tincture of Virginia snake-root, or the compound powder of ipecac and opium may be administered.

If the disease does not yield under such treatment, hot fomentations should be applied to the abdomen. A hop poultice, or a bag of hops wrung out of hot water will answer an excellent purpose. But should the case still prove obstinate, although at first it may not have been thought necessary to employ a cathartic, it will now be necessary to resort to that measure, for if not as an evacuant, it is required as a revulsive and depletive agent. The cathartic medicine above recommended will prove all-sufficient, and will be more efficient as a means of depletion in removing from the blood those matters and elements which interfere with healthy secretion and free capillary circulation, than blood-letting, even though carried to the utmost limit of heroic practice. In addition however, to these measures, others may be employed if necessary. Cups may be applied on that part of the abdomen where the most pain and tenderness is felt. They may be used dry, or if local depletion is deemed desirable, the scarificator may be employed. You can not in this way abstract enough blood to injure the quality of the

THE ILLNESS.

After the removal of the cups, the patient is treated with the hot fomentation to the abdomen. This last-mentioned article, which is of very great advantage, is applied to the abdomen and relaxes the abdominal muscles, and gives comfort to the patient as any other remedy.

If the patient still persists, it will be necessary to repeat the fomentation on the second and perhaps the third day; but the symptoms may be more mild after the bowels have been opened. I have found a combination of castor oil and opium a good remedy. This combination is not so apt to increase action, and produce more violent evacuations. If the symptoms demand it, it may be repeated, but by all means there should be no over-purgation. This will tend to reduce the inflammation, and with it you will find the pulse gradually returning to its normal state.

When the fever is distinctly marked with periodicity, I hesitate to give a large dose of sulphate of quinia and prussiate of potash, until the fact is ascertained. The only indication for the use of the case, in reference to this feature, is the periodicity of the fever. Let us now consider the treatment of malarial fever. Let us first consider the most important indication.

The first indication by your first prescription, is to give a cathartic, and then in the next stage to give a powerful medicine; and in this way the paroxysms are arrested. I here allude to the apprehension of injury to your patient by the use of remedies, though there may be a very great danger in the very often the inflammation will be arrested by the use of medicines, like fire overwhelmed with water. In such cases, follows the administration of the cathartic, malarial nor peritoneal fever reappears. In the case where the inflammation is merely malarial fever. Where the fever is merely malarial, in the beginning, or where the fever is so far as to become a self-sustaining fever, the paroxysms will not so easily subside. Still they may be arrested by an arrest of the periodic fever, and

a cure very much promoted. An obstacle has been removed which must have utterly subverted all remedial measures so long as it remained. You will now be prepared to proceed with such further treatment as the case may demand, on the general principles already laid down.

I will add that some of our practitioners, and the late Professor Morrow among the rest, have spoken in high praise of the spirit-sweat in this disease, and I see no reason to doubt its efficiency. I have not found occasion for its use in this affection, and can not therefore speak from experience. I have however employed it with excellent effect in other cases, where indications similar to those presented here were to be fulfilled.

Should the case run on until the strength of the patient is very much reduced, it will become necessary to sustain him with tonics and perhaps stimulants. Carbonate of ammonia, ptelea tea, wine whey, and other agents of these classes may be employed, in connection with rubefacients and other revulsive measures externally applied. An irritating plaster applied over the entire abdomen will be of great benefit where the case is thus tedious.

It is scarcely necessary to say that the diet during the whole course of acute peritonitis must be light. It should be taken only in the liquid form, and be such as to furnish little or no excrementitious matter. After the inflammation is subdued, the diet may be gradually increased in quantity, and in its stimulating qualities. Convalescence must be managed with great care; all exposure must be avoided, and every thing which by impairing the equilibrium of the circulation, would tend to reproduce the inflammation, must be guarded against.

CHRONIC PERITONITIS.

The attack of peritonitis is sometimes so insidious as scarcely to deserve the title of an acute disease. Still, the nature of the morbid action only differs in rapidity or intensity from the ordinary acute form, and the symptoms so far as observable are the same. Even the anatomical characters, where death follows such an obscure case, are entirely similar to those observed where a protracted case of acute peritonitis finally proves fatal. Occasionally it is true, a tuberculous condition of the peritoneum is discovered, but there are no symptoms during life pointing with certainty to such a condition. Where there is a scrofulous diathesis, a hereditary tendency to tuberculous disease, and where a low grade of peritoneal inflammation is accompanied by glandular swellings, and

...tubercles in the lungs, it will be reasonable to suppose that the source of the local disease is the source of the local disease.

...acute *peritonitis* is merely a continuation of the disease, having partially worn itself out, or having been reduced to a low grade of morbid activity. It has a tendency to terminate either in health or in death. In the former state, the affection may continue for an indefinite time, more or less clearly, the ordinary signs of *peritonitis*. There will be tenderness and even rigidity in the abdomen generally, or confined principally to a particular locality. There will be diarrhea, alternated with constipation, according to the condition of the liver, and the state of the alimentary tube. There will sometimes be a general swelling of the abdomen generally or circumscribed swellings in the latter stages of the acute form, resulting from effusion, which may be so extensive as to constitute ascites.

If the disease is not relieved by appropriate treatment, the functions of the abdominal viscera will finally become essentially deranged, the general health undermined, and death will be the result. *Post-mortem* exploration will then develop the nature of the disease. As these mentioned in connection with the acute form, the adhesions will perhaps be more extensive, and the amount of effusion greater, though occasionally the adhesions are so extensive as to almost consolidate the abdominal contents, leaving little room for the effusion to be occupied by serum.

The treatment will differ materially from that recommended for the acute *peritonitis*. You will find it necessary to employ such measures as tend to sustain the energy of the system, to maintain as nearly as practicable a due equilibrium of the various organs, and a constant equilibrium of the fluids. To divert irritation from the peritoneum. To employ blisters, diaphoretics, and tonics internally, with the use of the liquid form and perfectly digestible, and to apply over the seat of the disease, daily bathing with warm water, and stimulating pediluvia, with rest and quietude, constitute the resources upon which you must rely. As a means of radical treatment, the application of the plaster should be applied over the entire region of the abdomen, and be so applied as to produce and keep up a constant discharge from the whole surface of the abdomen, if

the disease be extensive. This measure is not incompatible with a state of debility, but produces a favorable local impression, and by the copious discharge of pus which it sustains acts as an alterant upon the general system.

I will close my remarks this morning with a brief *clinical* statement of a case which, although not one of peritonitis, serves to illustrate a principle which, in practice, often connects itself with this and other forms of inflammatory disease. The patient is one of your fellow students. He had been sick four days and had taken several prescriptions of his own and his room-mates', such as cathartics, sudorifics, etc., but found no benefit. The attack was one of a febrile character, and had come on very slowly. When I saw him first, yesterday morning, his pulse was very frequent and resisting, the skin a little moist, but the capillary circulation quite imperfect, the tongue red, dry and glossy, having very little fur upon it. There was looseness of the bowels amounting to diarrhea, but the discharges, though yellow, did not indicate an undue excitement of the liver. The symptoms raised a suspicion of typhoid fever. There were even appearances of sudamina on his neck, but the patient assured me that these were commonly there in health. But with all these symptoms, there was another, which although very obscure, I did not fail to ascertain. This was a very slight increase of the febrile symptoms every afternoon, a restless night and more quietude toward morning. My *diagnosis* was at once made up. We had a case of malarial fever presenting a typhoid tendency, and which if left to itself would soon develop symptoms of a very grave character.

I directed quinia and iron *āā* to be administered in six-grain doses every two hours during the forenoon, and four or five similar powders to be given in the same manner the next morning. He took three of the powders before the fever appeared to rise.

I saw him in the evening, and observed a manifest change in his countenance, and the general tone of his system. The fever had assumed a very different type, the pulse was full and bounding, and the energies of the system seemed now fully roused for the first time since the attack.

I called upon him this morning, and found him up and preparing to come to college. This was of course forbidden, for I deemed it necessary that he should guard against a paroxysm to-day; but to-morrow morning, gentlemen, he will be with you.

LECTURE XXIX.

LOCAL DISEASES—CONTINUED.

Stricture of the Rectum: Preliminary Remarks; Two Forms; Spasmodic Stricture; Symptoms and Causes; Treatment; Organic Stricture; Two Varieties; Non-Malignant; Symptoms and Causes; Treatment; Cancerous Formation; Symptoms; Treatment—Radical—Palliative. Hemorrhoids or Piles. Frequency and Importance; Definition; Varieties; Constitutional Condition; Local Development; Primitive Type; Positions of Tumors; Bleeding Piles; Wart-like Excrescences; Diagnosis; Causes; Treatment—Constitutional—Local—Removal by Ligatures—Precautionary Measures.

STRICTURE OF THE RECTUM.

I shall now spend a short time in speaking of *Stricture of the Rectum*, a difficulty in some degree allied to the subject of chronic dysentery, not only in affecting the lower portion of the alimentary canal, but also in following or resulting from chronic inflammation of the rectum.

This affection often calls for the exercise of as much tact and as prompt exhibition of professional skill as almost any other disease. Though the case may not present very alarming symptoms, as looking toward a fatal termination, yet the extreme sufferings of the patient call none the less loudly for your prompt and judicious interposition, to afford relief.

There are two forms in which obstruction in the rectum is found to exist. One of which may be styled *Spasmodic Stricture* as resulting from a spasmodic contraction of one or both of the sphincter muscles, or of some portion of the circular fibers of the muscular coat of the rectum; the *organic* or *structural stricture* being dependent on a morbid change in the structure or a carcinomatous growth at some point in the wall of this portion of the bowels.

Spasmodic stricture of the rectum is rarely an original disease, but generally results from irritation connected with hemorrhoids or following dysentery. It may however, be produced by hardened

feces, long retained in the rectum; and occasionally it is dependent on irritation of the roots of the spinal nerves, which irritation is reflected to the part where the spasmodic contraction exists, generally the sphincter ani muscles.

In either case when the constriction is very great, the suffering of the patient often becomes exceedingly severe. This is especially the case during the efforts at defecation, but the pain does not always cease with such efforts, not even when successful. I have seen cases, particularly those where irritable hemorrhoidal tumors existed, in which the pain was so extremely distressing as to extort a groan at nearly every breath, for hours together, from the stoutest-hearted patient. In such cases, considerable constitutional disturbance will be likely to grow out of it. The skin becomes hot, the pulse excited, and the tongue coated, while the bowels will generally be quite costive. In mild cases there is apt to be a constant desire to go to stool; but very severe cases lack this symptom; the patient often expresses an inability to void any feces, but feels a constant spasm accompanied with a sensation of "pulling" in an upward direction, as I have heard them express it.

The spasm is so severe and the stricture so complete, often, as to preclude the possibility for the time of introducing the smallest tube of an injecting instrument. A sensation of tremor, alternately with more violent constriction, will be complained of, and often the patient finds relief only by a constant slight pressure with a very soft substance, applied immediately to the lower extremity of the rectum.

Treatment.—The indications are—first, to relieve the spasm and thus palliate the severe sufferings of the patient; and secondly, remove the cause of the difficulty. I have found an ointment prepared from the wild indigo (*Baptisia Tinctoria*) as a base, with the addition of the extract of belladonna sufficient to relax the muscular contraction. This will be greatly aided by a warm poultice of roasted onions applied directly to the rectum, and changed every hour or two. The ointment should be freely applied around the anus and within the rectum, as soon as the sphincter is sufficiently relaxed to admit it. I have also seen very great relief from a warm injection of starch with a teaspoonful of tincture of opium, where the rectum was not so completely closed as to prevent the introduction of the pipe of a syringe. The bowels meanwhile, should be kept in a moderately soluble state by mild aperients, with a view to produce the necessary daily evacuations and

at the same time render their discharge as easy as possible, by making them soft. As good an agent to accomplish this object as you can employ, perhaps, is the compound taraxacum pill, so frequently recommended in other diseases; and this is particularly indicated where there is any evidence of hepatic torpor, which is seldom absent if the stricture is associated with hemorrhoidal affections. Where there is evidence of an acid condition of the alimentary canal, or of the system generally, the prescription best calculated to correct such condition and at the same time produce an aperient effect on the bowels, is in my estimation, the compound powder of rhubarb, which operates without producing sickness of the stomach, or griping or distress in the bowels.

If spinal irritation is the cause of the difficulty, or is associated with it, a tender point may be found by pressure along the spine, and cups should be applied at that point and followed by the irritating or compound tar plaster. Where there is inflammatory action in the lower portion of the bowels, as evinced by local or general symptoms, and whether such inflammation is the exciting cause or a consequence of the stricture, for it may be either, measures should be employed to reduce it. Cups should be applied as near the rectum as they can be placed—either on the sacrum, or if the patient is a male, in the perineum, and repeated the next day if the circumstances of the case seem to demand it. In addition to this the patient may be directed to take a warm sitz bath once or twice a day. This measure is equally applicable under all circumstances of the disease, and will be found a valuable means of relieving the spasm.

Whatever then may have caused the spasmodic stricture, the general principles of treatment are clear. After the urgent symptoms have been relieved, and when the patient is in a condition to bear the remedies required for the removal of the primary difficulty upon which it depends, such measures must be instituted as the nature of the case may indicate. If hemorrhoidal affections have been the source of the difficulty, the remedies which will be recommended for such affections should be used. If the stricture has been produced by dysentery, either in the acute or chronic form, then those measures which I have heretofore fully presented for that disease will be required. In short, your prescriptions will of course be made in accordance with the condition of the system which it is found necessary to correct.

Organic stricture of the rectum.—This is a much more formidable

difficulty, and is attended with less promise of cure, if indeed it can be successfully treated at all.

This form of disease, presenting a permanent physical obstruction to the passage of the contents of the bowels, must almost of necessity be more gradual in its development and more insidious in its approach. Though the patient may be conscious of more or less uneasiness in the rectum, he will not be likely to recognize the true state of the case, until the disease has made considerable progress and more or less obstruction to the passage of the feces has been produced. A uniform attendant upon this obstruction is inactivity of the bowels, and consequently, a hardened and costive condition of the dejections is almost sure to exist, which renders defecation more painful and difficult than it would otherwise be.

The stricture in this form may, as before intimated, consist in one of two strictural modifications of the wall of the rectum; that is, in a simple non-malignant increase in thickness, or in a malignant or cancerous growth; the one generally amenable to appropriate treatment; the other, especially if located entirely within the bowel, generally unmedicable and consequently fatal.

The *non-malignant* organic stricture may result from chronic dysentery, in which extensive induration has supervened from the inflammation, or it may be produced, partially, by cicatrization following ulceration—a process very often, if not always, attendant on chronic inflammation of the rectum. But probably the most common cause of this difficulty is the induration which so often follows extensive hemorrhoidal swellings, and which is no doubt, produced by the obliteration of hemorrhoidal veins under the influence of inflammatory action always attendant on severe attacks of piles. The obstruction may in fact often be traced directly to such attacks, being generally developed after the subsidence of hemorrhoidal inflammation.

Diagnosis.—This variety of organic stricture will readily be distinguished from the cancerous formation, by the absence of nearly all those symptoms of uneasiness, pain and distress, which are always present in the carcinomatous growth, as well as by the difference in physical character which the two affections present; the non-malignant growth being smooth and elastic, though perhaps lobulated; while the cancerous tumor is rough, unyielding and irregular.

If the difficulty results from induration of hemorrhoidal tumors, the swelling will usually occupy one side of the passage, though it

may extend nearly or quite around it. It is often located so near the orifice as to be partly external, and as it may result from more than one original tumor, each of these may remain distinct, and the whole present a smooth, somewhat elastic, though moderately hard mass, more or less completely filling up the passage. Owing to the mode of its development, the swelling will have a knobby or lobulated surface, and in some instances one or more of the prominences may assume a pendulous character, being attached to the main tumor by a somewhat constricted neck.

If the affection is an induration following dysenteric inflammation, there will be little or no external swelling, but the history of the case and the existing impediment to the alvine evacuations, will enable you readily to determine the nature of the difficulty. The stricture may, in this case also, be confined to one side of the rectal tube or it may occupy the whole circle; it may be confined to the lower portion; it may be located as high even as the sigmoid flexure of the colon, or it may occupy a considerable portion of the length of the rectum. The obstructions may be a mere thickening and induration of the sub-mucous and cellular membrane, or it may consist of an indurated non-malignant growth and present an undefined tumor, occupying more or less perfectly the cavity of the bowels. Cases have been reported where the passage was thus entirely obstructed, and the feces, accumulating above the tumor and producing ulcerative inflammation, had a new channel excavated for them by that process. Such instances however, are very rare, and even where such a result takes place, it offers but little encouragement to the hopes of the sufferer, for the constitutional disturbance necessarily attendant on such a condition, sooner or later undermines the health and the patient sinks.

The difficulty may be dependent on the presence of one or more polypi. The polypus is a soft tumor attached by a neck to the wall of the rectum, but the growth may be so extensive as to cause obstruction. Polypi may generally be removed from the rectum by means of ligatures.

Treatment.—The patient should be admonished in the beginning, that a considerable stock of patience will be necessary to sustain him through a course of treatment sufficiently protracted to remove obstructions of the kind we have been describing. I do not of course include polypi in this remark. Except for the purpose of correcting any general derangement of the system which may attend the case, little can be effected by medicine

administered internally. It will of course be important to keep the bowels in a soluble condition, and when this can not be accomplished by regulation of the diet, recourse will be necessary to aperients; and in that case, the articles mentioned under the head of spasmodic stricture will be all-sufficient.

Should there be evidence however, that the local difficulty is connected with a contaminated state of the system, such as the scrofulous habit or the venereal taint, it will be important to administer a suitable alterative and continue it during a considerable period of time. The alterative sirup or the compound sirup of stillingia, may be employed in combination with such other agents as the particular condition of the system may indicate, such as iodide of potassa, or one of the preparations of iron.

The main reliance in the treatment of uncomplicated, non-malignant, organic stricture, will be upon the use of a bougie introduced into the rectum, daily or oftener, and allowed to remain an hour or two each time; gradually increasing the size of the bougie as the dilatation of the passage will permit. This should be accompanied by an application of a small cup with scarification to the coccyx, which should be repeated a number of times, especially if the induration can be discovered upon an external examination. This should be followed by the application of a small caustic issue either in front of or behind the anus, to be kept discharging for a long time.

As has been intimated, where the obstruction is produced by a polypus, or by more than one, a ligature may be passed around the base or neck of each and drawn so tightly as to interrupt the circulation, and thus effect its removal. This may be readily accomplished with the aid of an anal speculum and such other instruments as the character of the case will suggest.

The *cancerous formations* in the rectum will be recognized by shooting, lancinating pains, which extend up into the bowels and down the thighs, and sometimes to the neck of the bladder. The tumor when examined by the finger, presents usually an uneven, knotty surface, and a degree of hardness much greater than any of the formations of which I have been speaking. If it has advanced to a state of ulceration, there is an acrid discharge having a very offensive odor, peculiarly characteristic of cancerous diseases. In this condition the obstruction presents irregular, hardened, and inverted edges, and is more or less covered with fungous growths of a softer and more yielding structure.

These cases come on very slowly and are usually accompanied with appearances of general ill-health,—such as a pale and sallow complexion, some emaciation, and often an edematous condition of the extremities, with a cool and clammy state of the skin.

In some cases the affection is confined to a small portion of the rectum immediately within the verge of the anus; in others it is located further up the bowel, and sometimes occupies a considerable area. In other instances the cancerous tumor is exterior to the sphincter, but extends up by the side of the bowel in the cellular structure. I have myself treated cases of this kind.

In the early stage of this variety of stricture, constipation usually exists, but after it has become an open cancerous affection, a relaxed condition of the bowels usually comes on, and as the disease progresses, proves an inconvenient and sometimes very troublesome symptom.

The *treatment* of cancerous stricture of the rectum, in cases of any considerable extent, and especially where the morbid structure extends far up the bowel, will seldom accomplish more than simple palliation. But where the tumor is situated external to the sphincter muscles, and does not extend far up by the side of the rectum, and does not involve the coats of that tubule, there is ground for a reasonable hope of an entire cure. Even where upon proper examination, the morbid growth is found just within the verge of the anus, if it does not involve the muscular coat of the intestine, and the general health of the patient is pretty good, the case should not be regarded as positively incurable.

Where it is deemed proper to make an effort for the extirpation of the cancerous growth, an application of the oak caustic should be applied, as extensively as the patient can bear it, and followed by a slippery-elm poultice made soft and applied cold. The poultice should be changed so frequently as to prevent its becoming dry, and when the part which has been deadened separates and comes off, the caustic should be applied again as at first, to be followed also by a poultice. Where a part only of the tumor is covered at one time, it may be attacked in a new place as soon as the patient shall appear able to bear it, without waiting for the first slough to come off. By making these applications as thoroughly and extensively as practicable, you will be able to destroy the cancerous structure more rapidly than it can grow, and thus finally remove it, if it can be removed at all with safety. Should inflammation to any considerable extent be excited in the surrounding textures, the

application of a small cup with scarification will generally be sufficient to relieve it.

If this application does not act as favorably as you may desire, the *sulphate of zinc* mixed with *acetate of lead* may be substituted. The action of the sulphate of zinc usually produces more pain than the caustic, but is not likely to excite as much inflammation in the adjacent vessels. It may be applied in the form of a plaster mixed with flour and a little charcoal, or the dry powder may be used. In using this, as with the oak caustic, the application of a poultice once or twice a day will be a necessary part of the general course. These, with such collateral means of local or general influence, as the circumstances of the case may suggest to the intelligent practitioner, comprise the measures to be relied on in the radical treatment of this form of stricture.

In those hopeless cases, where a merely palliative course of treatment is to be pursued, such attention should be given to the bowels as may be necessary to keep them in a quiet, yet soluble state. In case of constipation, a mild aperient may be given, and where there is a tendency to diarrhea, which is most likely to be the condition in the advanced stage, mild, soothing, yet restraining injections, and the internal administration of opium will be proper. If there is much pain or uneasiness at the same time that opium is contraindicated, the extract of *hyosciamus* may be given.

HEMORRHOIDS, OR PILES.

There are few complaints for which a practicing physician is more frequently called upon to prescribe, than piles, and there are few diseases in the treatment of which he will often find it necessary to exercise more skill and perseverance. It behooves us therefore so to consider the symptoms of the affection and the causes operative in its production, as to attain a perfect understanding of its nature and proper management.

Every person knows what is meant in common parlance by the term piles, and if successful treatment affords evidence of correct information in regard to the character of the difficulty, the domestic practitioner might sometimes claim higher attainments than some men of science. But within the profession, as well as out of it, the circumstances connected with the cause of the disease have never been sufficiently observed and considered, otherwise the frequency of its occurrence would have been greatly diminished and its treatment much more successful.

The term *Piles* or *Hemorrhoids* has generally been applied to tumors that form about the rectum, either externally or internally, and also to discharges of blood, more or less copious, from the lower part of that tube. Though a free discharge of blood does frequently accompany hemorrhoidal affections, yet I am entirely satisfied that many of those cases of copious hemorrhage from the rectum, met with in practice, are not referable to hemorrhoidal swellings; the blood merely escaping from the veins of the anus, without the existence of tumors, and unattended by much pain.

Pile tumors may be said to present themselves in three general forms:—First, *External Piles*, situated mainly below the sphincter ani muscle; Secondly, *Internal Piles*, located within the rectum; Thirdly, *Bleeding Piles*, which may be either external or internal. The term *Blind Piles* is sometimes employed, also, to designate tumors, whether external or internal, which do not bleed. It may however, be remarked, that the distinctions here mentioned have reference rather to the popular understanding of the affection, than to any differences in a practical or scientific point of view: in other words, the terms employed merely denote the position of the tumors or the symptom of bleeding, which may, as above remarked, occur in the absence of hemorrhoidal tumors, but the intrinsic nature of the difficulty is the same in all these varieties.

The hepatic obstructions usually coëxisting with hemorrhoids, and the influence such a condition of the portal circulation seems to have upon the nervous sensibilities of the system and cerebral functions, produces, in many cases, a train of symptoms which indicate what some writers have termed the “hemorrhoidal effort,” or what may with propriety be called the *hemorrhoidal diathesis*. This state of the system is often marked by general nervous excitability, mental depression, and symptoms of functional derangement in most of the organs of the body; or to be more minute, by general debility and uneasiness, constipation of the bowels, loss of appetite, a furred tongue, distress or colic pains in the abdomen, and more or less pain in the head, with gloominess of feeling.

The constitutional symptoms may precede those of a local character for a longer or shorter period, though in some instances the general disturbance is so slight as to attract little or no attention. The *development of hemorrhoids proper* is attended with symptoms of congestion and irritation in the rectum, in addition to those of a general character—such as a sense of weight and downward

pressure in the lower bowel, frequent calls to stool without any discharge, with pain or uneasiness in the rectum. These symptoms may occur and continue for a time, and pass off without the appearance of pile-tumors, or they may increase until the local disease is fully developed. If the attack has not been preceded and caused by constitutional derangement, it rarely fails to produce febrile action with symptoms of general disturbance.

The *primitive* type of a hemorrhoidal tumor is merely a distended or varicose condition of a portion of the inferior mesenteric veins, produced by more or less fullness, and increased by local irritation, in the sphincter muscles, which generally produces a degree of inflammatory action in the vessels involved, and frequently in adjacent structures.

Each recurrence of this local engorgement and inflammation, though terminating in resolution, can scarcely fail to produce some degree of adhesion, and consequently every successive attack increases the thickness in the coats of the vessel, until a sensible induration is produced, constituting a tumor of greater or less dimensions. If the tumor should now be laid open, it would be found to consist of the coats of the vessel thickened by adhesion with surrounding textures, with a small cavity filled with dark, venous blood in a coagulated state. So long as this cavity is continuous with the vein from which it was formed, pressure upon the tumor will cause it mostly to disappear, by expelling the blood from the cavity, but when the pressure is removed, the former dimensions will be restored. But when the induration has proceeded so far as to cut off communication between the vein and the varix or cavity of the tumor, the coagulated blood becomes a source of irritation and inflammation, and additional adhesion occurs by the effusion of lymph. In this way a vascular, fleshy, spongy, and somewhat elastic tumor is produced, having the character, in most cases, of a slightly pendulous excrescence, attached by a narrowed neck-like base. The form of the tumor is no doubt produced by compression of the sphincter muscles.

I have now given you a brief description of the different stages in the formation of a pile-tumor. But it should be remembered that though each tumor is thus formed by the enlargement of a small vein, that these veins being numerous, several tumors may be formed at the same time or in succession, and that in this way a large portion, or even the whole of the circumference of the

outlet of the rectum may be occupied by tumors, varying in size from the size of a bean to that of a walnut or perhaps larger.

Hemorrhoidal tumors may be formed at the lower edge of the sphincter, at its upper edge, or between those points. When situated near the upper border of the sphincter, their position will generally be within the bowel, for the contraction of the muscle will tend to press them upward, so that they constitute internal piles. They will it is true be brought down during defecation if their size is considerable, and appear externally, but will usually be drawn back as the muscles contract; though when they are very large and the mucous membrane somewhat relaxed, they often require some pressure to cause them to return. Where the tumors are formed near the verge of the anus, the action of the sphincter will be of course to force them downward, and hence they become more and more prominent externally as they increase inside. They may originate so low indeed, as to become covered in part by the skin as they increase in size.

In some cases the varices become so distended as to burst and discharge a large quantity of dark venous blood, and this constitutes what is termed *bleeding piles*. Where bleeding occurs, though considerable soreness and pain is experienced for a number of days, it usually prevents the induration that often attends an attack of piles; hence persons who are subject to bleeding piles, rarely have those permanent fleshy tumors so common in other cases. If the ruptured varix happen to be within the rectum, it forms a case of "internal bleeding piles."

Where pile-tumors have been formed in the manner heretofore described, they are subject to constant attrition, incident to the movements of the body whether walking or sitting, to the passage of the feces and the contractions of the sphincter; by this means the epithelial covering often becomes so thickened and indurated that the tumors become almost insensible, and present the character of *wart-like excrescences* occupying the verge of the anus.

The inflammation in the hemorrhoidal tumors may progress so far as to result in *abscess*, which may produce a fistula. Or the inflammatory action may degenerate into a degree of irritation, which without much pain will keep up a constant secretion of mucus, as seen in chronic dysentery.

A few words may be necessary on the subject of the *diagnosis* of hemorrhoids. The only diseases with which this affection is likely

to be confounded are polypus and prolapsus ani. It will be readily distinguished from *polypus* by the mode of attack and the difference in the character of the tumors. Polypus comes on in a very gradual manner, without any particular paroxysms of pain or distress; and is not when formed very tender under pressure, while piles are often exquisitely tender and generally very painful, come on more rapidly and occur in paroxysms. Polypus has usually a smaller neck and is less solid and elastic than the pile-tumor. From *prolapsus ani* piles may be easily distinguished, by the uniform norrig-like character of the swelling, and especially the red and raw appearance of prolapsus.

Let us now, gentlemen, inquire into the *causes* of piles. On recurring to the observations already presented, while speaking of the development and symptoms of the affection, you readily perceive that two circumstances, or rather conditions of the system, must exert a powerful influence in producing hemorrhoids; I mean *torpor of the liver* and *constipation of the bowels*. As all the blood from the mesenteric veins must pass through the portal vein and its minute ramifications in the liver, it is evident that any obstruction in the latter organ must in proportion to its extent, retard the current of blood from the intestines and dam it up in the mesenteric veins, producing engorgement of their radicals, especially of those which are lowest and most remote, as those of the rectum. But obstruction of the hepatic circulation is usually accompanied by constipation of the bowels, a condition which of itself greatly favors the production of piles. The accumulation of fecal matter in the large intestines, must interfere with the free circulation of blood in the mesenteric veins, while its occasional discharge in large consolidated masses, forcing the blood down into the lower extremity of the bowels, and irritating and sometimes wounding the mucous surface, tends directly to produce a varicose condition of the hemorrhoidal veins and an inflammatory condition of the parts. As a matter of course then, where hepatic obstruction and torpor of the bowels exist at the same time, there is a two-fold tendency to hemorrhoids, and whatever operates to produce either or both these conditions should be regarded as a cause of local disease. A *plethoric state of the circulation*, resulting from sedentary or indolent habits and a rich stimulating and nutritious diet, also greatly predisposes to the development of piles; and this condition may, and indeed often does, coexist with portal obstruction and constipation. Hence it is, that individuals accustomed to habits of inac-

tivity, and who at the same time are fond of "good living," are so frequently afflicted with this disease.

Pregnancy is another condition that favors the production of hemorrhoids, especially in the later stages of gestation. The pressure on the ascending vessels greatly tends to produce a congested and varicose condition of the hemorrhoidal veins, as it often does in those of inferior limbs.

This affection is also produced, in many cases, by the use of *drastic purgatives*, especially the *aloetic* kind; and by irritating injections sometimes employed in the treatment of other affections. *Ascarides* may produce it also, and it is quite a common attendant or result of dysentery or diarrhea, especially the former, for these cases are generally attended by more or less obstruction in the portal circulation. Inflammation of the prostate and of any of the pelvic viscera may also be causes of piles. Where there is a strong predisposition to the affection, it will often be brought on by the friction and pressure experienced in the part, or riding on horseback.

In the causation of piles we may also recognize a hereditary predisposition, which will afford in many instances, an explanation of its occurrence under circumstances not usually sufficient to produce it: for there is no reason to doubt that hereditary tendency may have as much influence in favoring the development of hemorrhoids as of any other disease.

Treatment.—In the healing art, as in political economy and theology, it is of the utmost importance frequently to recur to first principles. Hence it is that I so constantly urge you to regard the causes of disease, as constituting the first and paramount subject for consideration in deciding upon your course of treatment. In recurring to what has been said on the subject of the causes of piles, we shall have very little difficulty in obtaining a clear conception of the indications to be fulfilled in each case.

If the disease is associated with *torpor of the bowels* and consequent accumulations in the large intestines, the first step will be to remove those accumulations, by the administration of cathartics. The choice of remedies from this class of therapeutic agents must be governed by the peculiarities of constitution and the condition of the patient at the time. If there is a red tongue and other symptoms of gastric irritation, a mild cathartic should be selected, such as the compound powder of rhubarb, or the Seidlitz powders, and the administration of it repeated occasionally until

the desired effect is produced. But if no evidence of such irritation exists, the contents may be removed by a more efficient and speedy cathartic, such as compound powder of jalap, mixed with equal parts of cream of tartar. But whatever the agent used at first to unload the bowels, they should afterward be kept in a soluble condition by means of some mild laxative, so as to secure an easy evacuation daily, avoiding over-action, as that would tend to aggravate the symptoms and materially add to the sufferings of the patient.

If the piles are the result of hepatic congestion, or of portal obstruction from any cause, the remedies to be employed must be directed to the relief of the liver. If there are accumulations in the stomach, as indicated by a thickly coated tongue and other symptoms, a gentle emetic will do much to secure the proper action of the subsequent remedies, and will also exert a beneficial influence on the hepatic torpor; and if no valid objection to its administration exists, it should certainly be prescribed. Any of the emetics which I have recommended in other cases will answer the purpose here, but perhaps one of the best articles that can be used, as it evidently exerts a more direct influence on the liver than most others, is the acetous tincture of lobelia and sanguinaria. Or if the eyes exhibit a yellow tinge and the skin a sallow hue, and there is a thick yellow coat on the tongue, an emetocathartic dose of podophyllin or of podophyllum in powders, may be given. But if emesis is not thought necessary, or after it has been produced as at first suggested, a free cathartic effect of podophyllin and leptandrin, or of the compound taraxacum pills, should be obtained, and afterward the pills should be given in aperient and cholagogue doses, so as to procure at least one free bilious evacuation every day. The same pills, but in less doses, may be given in cases where there is irritation of the bowels, with diarrhea.

While these general measures for the removal of the cause in different cases, are being employed, much relief to the sufferings of the patient may be afforded by mild and soothing local applications. In those cases which present a soft, elastic, and dark-colored swelling, being evidently a distended varix, in which there is a severe throbbing and painful uneasiness, I have occasionally witnessed the most prompt temporary relief from puncturing the tumor, so as to discharge the accumulated blood and allow the vessel to collapse. This measure should be followed by warm and

soft fomentations. But where puncturing is not deemed proper, or the patient is unwilling to submit to it, a warm starch injection, by its soothing influence, will sometimes afford very prompt relief, especially if followed by a soft poultice of roasted onions, applied as warm as can be borne with comfort, immediately upon the swelling.

Where the spasm of the bowel is so severe as to amount to an entire obstruction, producing, as is sometimes the case, a well-defined spasmodic stricture associated with piles, a pill composed of three grains of opium and half a grain of belladonna may be introduced into the rectum. This may be done by putting the pill into the end of a gum-elastic catheter, and after introducing the instrument dislodge the pill by means of the wire. If it is not deemed advisable to use the pill, an ointment made of the wild indigo as a base (*see the unguentum baptisæ* of the *American Eclectic Dispensatory*), with a small portion of extract of belladonna and a little tannic acid will be found a very soothing, antispasmodic application. I have also frequently seen the sufferings of the patient greatly relieved by applying cold water freely to the part, in cases where inflammation and heat existed. It should not however, be applied with a view of producing and continuing the sedative effect of coldness, but having applied a cloth wet in cold water, it should only be changed often enough to prevent its becoming dry—say once in three or four hours. In these cases I have also generally applied a cup to the coccyx as near the inflamed part as practicable. I have also applied in similar cases and with marked advantage, a poultice made by bruising the leaves of common house-leek (*sempervivum tectorum*), and changed two or three times a day; and in place of this I have found a soft slippery-elm poultice answer a very excellent purpose, applied cool and frequently changed.

Where the disease results from pregnancy, and especially after parturition, where the labor has been very severe, it is sometimes exceedingly painful; and I have seen under such circumstances, tumors larger than a goose's egg. In such cases, the starch and laudanum injections and soft onion poultice have seemed to afford more prompt and permanent relief than any other measures I could employ. They may be repeated as often as necessary to secure their continued effect.

In every modification of the disease, it will be an important point, which you should never overlook, to keep the bowels free

from accumulations, by administering some mild aperient, or by the use of such articles of diet as shall secure a soft and full evacuation every twenty-four hours; but more than this, after the operation of the first cathartic, will be unnecessary, and would be likely to do more harm than good. Where a simple aperient is desired, and no other indication is to be fulfilled, a small portion of sulphur and cream of tartar may be taken every morning.

For *bleeding piles*, such of the foregoing treatment as the circumstances of the case may indicate should be employed, and in addition thereto, a strong decoction of oak bark should be used as an injection and the bowel freely bathed with it two or three times a day, or the patient may be directed to wear a compress wet in the decoction, and changed as often as may be necessary to keep it moist; and if the case is attended with much pain, great advantage may be derived from bathing the tumors and adjacent parts, freely and frequently, with a liniment composed of linseed oil four parts, and oil of origanum one part. It should be applied two or three times a day, and a piece of soft linen may be saturated with it and kept constantly in contact with the tumor, at the same time that a small quantity of the oak bark decoction is kept within the bowel by occasional injections. I have in fact, used this liniment with the addition of a small portion of laudanum, as a *discutient* to the more recent pile-tumors, having a somewhat fleshy character, where the smelling did not disappear with the decline of the active or acute symptoms, and with excellent effect. While using the liniment for the purpose of discussing the tumors, they should be bathed freely two or three times a day in the cold decoction of oak bark.

Where the tumors have acquired a decidedly fleshy character, and especially where they have a constricted base or neck, there is no measure so effectual and speedy, and at the same time so safe, as the application of ligatures, with a view to their removal. While this means effectually removes the tumors to which it is applied, it is generally followed by the disappearance of contiguous smaller ones, so promptly and completely, as to leave little room for doubt, that the removal of the large tumors exerts a discutient influence upon those which are less fully developed. By this means, too, the tendency to the frequent recurrence of hemorrhoidal inflammation, under slight indisposition, will often be entirely broken up, and the patient enjoy in the future, complete immunity from such attacks. It is a very simple operation, even though the tumors

may be situated within the sphincter; as they can usually be brought down by a straining effort of the patient, as in difficult defecation. When the tumor appears, it may be seized with a forceps, armed with a ligature. If they can not be brought to view in this way, there will be but little difficulty in getting at them by opening the orifice with an anal speculum. Most generally however, tumors of this kind are situated below the sphincter, and the ligature may be applied without difficulty. Hence, very little instruction is necessary to enable you to perform this simple operation; all that is requisite is a double silk cord, waxed, which should be carefully drawn so tight as to intercept entirely the circulation in the tumor; for if this is not done, it will greatly increase the suffering of the patient, and require to be tied again, which will produce more pain than the first application. I have in this way applied ligatures to quite a number of hemorrhoidal tumors, and have thus far uniformly succeeded; never having realized the inconveniences suggested by some eminent surgeons; for the pain has uniformly subsided in a few hours, and I have never yet found it necessary to remove the ligature till the deadened tumor came away. I can not but think that the evils resulting from the application of the cord-ligature, described by Dr. Physic, and reiterated by Dr. Gibson, were mostly imaginary, and offered as substantial objections, in an argument in favor of a new method, suggested by the learned author first named. I have in a number of instances, seen patients going about the next day after the application of silk ligatures to pile tumors, and in every case without any serious trouble following; and I must, therefore, be permitted to recommend the use of such ligatures in preference to those of Dr. Physic. The canula and wire can not be applied, though but for a short time, without very much incommoding and annoying the patient, while the ordinary ligature encounters no such objection; and as it may be applied so tightly at first as to render its removal and reapplication unnecessary, the objections urged by Dr. Gibson have no force. If tightly applied with a double knot, it must of necessity destroy the vitality of all that it encircles, and of course the tumor loses its sensibility and can not be the seat of pain, and there is therefore no reason for removing or modifying the ligature, but it should be let alone until the slough comes off. If any inflammation should supervene after the ligation of the tumor, the fomentations, soothing poultices, etc., recommended for that condition under other circumstances, will be indicated. But I have

generally found my patients far easier the day following the application of the ligature, than they were before; the ligated tumor shriveled and insensible, and the surrounding parts in a far less irritable condition. Very simple dressing may be applied, and as the tumor separates, the part readily heals without much soreness or discharge.

Where the affection has been attended for a *long time by bloody discharges*, to which the system has adapted itself, a question will arise as to the propriety of promptly causing a cessation of the hemorrhage, since the system may substitute it by a lesion in some more vital locality. It is said that the results most to be apprehended, are apoplexy and pulmonary hemorrhage. Hence in patients who have a predisposition to either of these affections, the piles should either be allowed to continue, under merely palliative treatment, or an artificial drain by means of an issue or seton should be established, and the patient subjected to such general treatment as will fortify his system against the apprehended danger, before the use of means for the radical cure of the hemorrhoids.

LECTURE XXX.

LOCAL DISEASES—CONTINUED.

Fissure of the Rectum: Description; Appearances; Causes; Treatment—General—Local. Fistula in Ano: Remarks; Causes; Character; Treatment—Local and General. Prolapsus Ani: Character; Symptoms; Cause; Treatment.

FISSURE OF THE RECTUM.

It is a little remarkable, that a disease so common and so readily recognized, should so far have escaped the notice of authors, as not to be described, till within a comparatively recent period. Dr. Gibson considers it a rare disease; and remarks that “although connected for the last twenty years with the largest hospital in America, I have seen very few cases which could be said to correspond in the symptoms, with the details furnished by writers.” But my experience does not justify this conclusion; since in private practice I have frequently met with it and have treated a number of cases.

This disease requires no very elaborate description, since it consists generally of a mere superficial ulceration of the mucous membrane of the rectum; sometimes wholly within the sphincter muscles, and sometimes mainly without. The usual location will be found in that portion of the mucous membrane of the lower bowel included in the sphincter muscles; but extending above into the free membrane, and commonly so far below as to be seen. It presents the appearance of a fissure, mainly on account of the folded condition of the mucous membrane at this place, produced by the contraction of the sphincter muscles in closing the extremity of the bowel. This fact is distinctly shown by opening the sphincter with an *anal speculum*;—thus spreading out the mucous membrane connected with the *fissure*, when a superficial ulcer will be brought to view, rarely extending through the mucous membrane; though occasionally it will be found otherwise. The ulcers, when thus exhibited, present an indolent character, and generally have

slightly irregular, indurated and raised edges; though in recent cases they have a more superficial aspect—without unhealthy induration—and have a vascular and granulated appearance.

The pain accompanying fissure of the rectum occurs usually after every stool, is of a burning and shooting character, and is often very severe for an hour or two after each evacuation, especially if the bowels are costive, producing a spasmodic constriction of the rectum.

This disease sometimes follows chronic dysentery, and I have also met with a few cases connected with the *Mexican* diarrhea. It is likewise produced by long-continued costiveness, distending the rectum with hardened feces.

When the disease is confined to the bowel above the sphincter ani, it is productive of but little pain; though a slight soreness and burning sensation will be experienced after every evacuation. In this case the existence of the disease will be more particularly indicated by a discharge of matter from the bowel, either mixed with the feces or following the evacuation.

When it is confined to the folds of the mucous membrane below the sphincter muscles, a slight burning will be experienced after the evacuations, followed by a troublesome itching sensation. More or less discharge of a muco-sanious appearance, mixed with pus of an unhealthy and offensive character, accompanies the disease wherever it is located.

In severe and extensive forms of this disease, the irritation produced by it often extends to the bladder, producing irritation and pain in evacuating the urine.

The local affection is generally associated with an unhealthy state of the general system. This is clearly shown by the pale and sallow complexion, associated with more or less disturbance in the digestive functions and general derangement of the secretions.

In the *treatment* of this difficulty, the main indication will be fulfilled by removing the cause that produced it and restoring the general health of the system.

The remedies heretofore directed for chronic dysentery or diarrhea, will be equally appropriate when they are complicated with this disease. If caused by hardened accumulations in the rectum, they should be removed, and the bowels kept in a soluble state by mild aperients—such as the *taraxacum* pill, cream of tartar and sulphur, congress water, or some other inoffensive and mild remedies; and the use of suitable articles of diet. A healthy condition

of the skin should be promoted by appropriate bathing, and of the other secretory organs by remedies calculated to bring into action their depurating influence upon the general system. The remedies most in favor with our practitioners for a general vitiated state of the system, are the compound syrup of sarsaparilla and the compound syrup of stillingia of our Dispensatory, which in such cases should be given for some time.

The *local measures* are no less important in these local and long-standing diseases, than those of a general character, though by restoring the general health and removing the exciting cause, most cases would no doubt ultimately recover. But appropriate local appliances will hasten, in all such cases, the final cure.

Those cases presenting the *callous edges* with an indolent general appearance, will be more promptly relieved by the application of the oak caustic. I should remark that the edges and unhealthy granulations should be barely touched with the caustic, as more than this will be certain to produce too great a cauterization. It can be applied by opening the bowel, as for other purposes, with the anal speculum, so placed as not to cover the fissure, or it can be turned when introduced. The part to which the caustic is applied immediately turns dark, when it should be washed off with diluted vinegar, to prevent its further action; and you should be very particular to see that the application is entirely confined to the points desired. One application of the caustic will usually be sufficient, as when the morbid structure, destroyed by the application, comes away, the fissure will present a soft and healthy flesh-colored appearance, and with other mild and simple means, will very shortly be cured. The application of the caustic should be followed by a soft slippery-elm poultice to the rectum, and the patient advised to keep still for a few days, in order to allow the irritation to subside and afford greater convenience in changing the poultice, which should be done three times a day. After the irritation has disappeared, the parts may be washed two or three times a day with a decoction of *hydrastis canadensis*, and then dressed with any simple plaster; such as our black salve or the yellow ointment.

If it should be found that the first application of the caustic, with the subsequent treatment just recommended, was not sufficient to remove the induration and excite healthy action in the parts, or if fungus granulations should sprout up, the parts may be washed every second day with a saturated solution of the

sesquicarbonate of potash, or they may be touched with a pencil of nitrate of silver, which rarely fails to excite a more healthy condition.

If the applications should at any time induce a spasmodic action of the rectum, which the soothing influence of the poultice is not sufficient to relieve, an ointment prepared from the wild indigo, with a small portion of the extract of belladonna, may be applied to the parts, two or three times a day; or the patient may be directed to sit over a decoction of hops, which will rarely fail to afford relief. This may be repeated at any time when the pain is severe.

In less severe cases, not exhibiting the callous and indolent edges, the application, for a few times, of the sesquicarbonate of potash, in the form of the dry powder, by filling the fissure with it, and the subsequent use of the hydrastis, will obviate the necessity of the more severe application of the caustic. Or the nitrate of silver may be applied every second or third day with similar effect. But where there is great relaxation of the bowel, it will often be necessary, in addition to the means just considered, to use as a wash, either by injecting into the bowel, or washing freely with it, a decoction of oak bark once or twice a day.

FISTULA IN ANO.

It may be thought, that in considering this disease in connection with the subjects embraced in the theory and practice of medicine, I am traveling out of the record, or that I am discussing a subject legitimately within the province of surgery. When this disease was mainly treated with the knife, the position assigned it was proper; but since other measures are found more successful, and the use of the knife can be altogether dispensed with in its treatment, the subject should be considered in this connection.

The term *fistula* is used to designate a small, narrow, deep-seated ulcer, and when used in connection with disease of the rectum, it is called *fistula in ano* or *anal fistula*.

This disease consists in a small orifice situated near the lower extremity of the bowel, sometimes external to the sphincter muscle. In other cases the external orifice of the fistula is found from one to three inches from the anal outlet; in either case, the fistulous pipe passes up by the side of the bowel, above the sphincter muscles, and enters the intestine obliquely through its several coats into the cavity of the gut. The point at which the fistula enters

the bowel, is generally immediately above the sphincter muscle, though in some cases it is found higher up. Those cases having openings both internally and externally are called *complete* fistulae.

In other instances the fistulous tube passes through the cellular structure at the extremity of the bowel, and extends up some distance by the side of the intestinal tube without entering it, constituting what is called an *incomplete* or *blind* fistula.

Fistulous pipes sometimes commence in the mucous membrane of the lower part of the bowel, and pass through its several tunics into the cellular structure by the side of it, without communicating externally. This is called the *internal* fistula, and seldom continues long before the matter finds its way through the integuments.

These several fistulous formations generally result from abscesses occurring in the vicinity of the rectum, the loose character of the cellular structure at this place preventing an immediate union in the deep-seated breach of continuity, while the opening at the surface heals readily. A portion of the matter formed being thus retained, burrows still deeper and extends in both directions, till at length it forms an opening into the bowel, and at the same time, perhaps reopens that through the integuments at the surface. After the opening is complete into the intestine, some portion of the fecal matter finds its way into the opening thus made, and passing down through this artificial tube, emerges with the secretion from the fistula, through the integuments. The inflammatory action accompanying the several stages of this process produces more or less adhesion and induration, while the secretion of pus and the feculent matter from the bowel, soon forms a permanent canal, which shortly takes on the function of a mucus-secreting surface. It will be observed, from the description I have given you of the phenomena of fistula, that a small tube-like opening, sometimes externally and into the bowel, but sometimes only externally or internally, with a secreting membrane lining it, and an indurated condition of the adjacent cellular structure, constitute the character of *fistula in ano*.

The disease may consist of a single incomplete pipe, or there may be a half dozen or more occupying the main circumference of the rectal outlet, in different stages of progress, from an imperfect burrowing sore, to a deep-seated and complete fistulous tube. They may also be connected with very little constitutional derangement, or they may be associated with a broken-down and contaminated state of the system. As a general thing however, anal

fistulas occur in old and debilitated persons, and weak and contaminated systems.

The discharge accompanying this affection is generally unhealthy and offensive, while the appearance of the local difficulty indicates a corresponding condition of the general system.

Anal fistulas sometimes result from the inflammation attendant upon hemorrhoidal swellings, and they frequently follow the formation of abscesses produced by the common causes of inflammation; such as hardened feces lodged in the rectum, or local injuries, and in some instances by long and protracted horseback riding.

Treatment.—The well-settled character of *fistula in ano* presents two main indications—first, to restore the general health of the patient; and secondly to destroy the secreting surface of the tubes and the indurated structure surrounding them.

In fulfilling the first indication, all I propose to say at this time, is that you should be governed by those general principles heretofore discussed, applicable in the treatment of other disorders involving the general health of the system. The condition of the skin, as exercising a most important influence in the curative process of all chronic affections especially, should always receive a full share of attention; while the secretions generally, as affording the necessary outlets of effete matter from the diseased tissues, should also be appropriately acted upon in all such cases. The condition of the digestive organs, as preparing the aliment to supply the waste of the system, and at the same time a proper amount of healthy and nutritious food, as a pre-requisite to the renewal thus made necessary, should both be the subject of your early attention.

The compound sirup of sarsaparilla, as a general agent, or the compound sirup of stillingia, may be relied upon in this disease, as the best alteratives we possess; while the compound tincture of tamarac, or the compound pill of aloes, or the compound taraxacum pill, heretofore recommended for other diseases, each in its appropriate place, as the condition of the system will indicate, may be mentioned as preferable to most other laxatives and tonics in these cases.

As a general rule, while the local applications are being made, patients should be kept tolerably still and quiet; but after the principal local appliances are completed, and a healing state of the local affection is produced, they should then be directed to take as

much exercise in the open air as their strength and past habits will justify.

The second indication will be fulfilled with great certainty, by the proper application of the oak caustic, or in some cases by the use of the sesquicarbonate of potash, with the ligature afterward properly used in cases of complete fistula.

The failure to effect permanent cures of this disease by the ordinary operations with the knife, I am well convinced, results from not first destroying the mucous membrane lining the tube and the induration connected with it; so that if I were convinced that the common method of treating fistula had advantages, in other respects, over the method which I am about to recommend, and I desired to use the knife, I should as a preparatory measure make use of the same means that I otherwise do, where I apply the ligature.

But I have seen such results following the operation in a number of cases where the knife was used (the loss of the use of the sphincter muscle and a consequent inability to control the contents of the bowel, which never follow the use of the ligature), that I can not in any case recommend that operation; especially since the course I shall recommend is equally sure, and in its results equally prompt, and far more safe for the patient's present and future comfort.

There are various modes of using the caustic in these cases, each of which has advantages under certain circumstances, not common to them all. Where the fistula is not very deep, I generally inclose a small portion of the caustic in one end of a lock of cotton, slightly twisted, and pass that part of it up the fistula with a probe, and allow the cotton to remain till the caustic dissolves, when the cotton can be drawn away by that portion of it which was allowed to be without. But if the fistula is deep-seated and extends far up by the side of the bowel, a saturated solution of the caustic may be thrown up the *pipe*, with a long probe-pointed syringe. In this way, not only the extremity of the fistula may be reached, but every part of the lining surface will be cauterized at the same time, and thus be entirely destroyed and carried away in a day or two. This application should be repeated as soon as the slough made by the first injection comes away, and should be repeated till the induration is removed; when, if it be an incomplete fistula, it will readily heal. Care however, should be taken while it is healing not to

allow the orifice to close at the surface till it has filled up from the bottom. This can be readily effected by introducing a tent every day, when it is dressed, while the healing process is going on. It will generally be necessary while the caustic is being used, to apply a soft slippery-elm poultice to the part, and change it twice a day.

If the fistula passes through into the bowel, the application of the ligature will be necessary to the cure; but this should not be done till after the callus has been removed by the application of the caustic, as just directed.

Various methods have been suggested for the introduction of the ligature. A very convenient and simple method, and one generally readily performed, is to have a probe made of flexible and inelastic metal, with an eye in it, which, armed with a double silk or linen thread, should be passed up the fistula until it meets the finger previously introduced up the bowel, and thus it can be readily bent and directed down toward the anus and passed out, when from its flexibility it can readily be withdrawn, and thus the wall of the fistula will be included. The ligature should then be loosely tied, so that a small, smooth, wooden or ivory "toggle," about an inch long, may be passed under it, and a turn or two taken for the purpose of tightening it. It should thus be turned every day, more or less, as the patient can bear it, till it comes away. Meantime the patient should keep still and if the parts should inflame, a soft elm poultice should be applied. When the ligature is through, the fistula will be cured; and as the induration has been previously removed, it will not be likely to return. It has this advantage over the common method with the knife, that the fibers of the sphincter muscle unite again as fast as they are separated; thus securing to the patient an immunity from the risk of a serious deformity, often following the operation with the knife. It has occurred to me as somewhat strange, that the deformity referred to did not more frequently occur than it does, when the fibers of those muscles are wholly separated at once, and prevented from immediate union by a plug of lint, in order to secure the discharge of the callus connected with the fistula, and ward off a return of the disease.

The common needle-eyed silver probe, if not too large and stiff, may be used in the same way as the flexible one. I have used it myself in a few cases; and when the opening into the bowel is

not too far up, the operation can be accomplished without much difficulty.

The instrument invented by Dr. Gibson, of Philadelphia, I have no doubt is a valuable contribution, and better perhaps than any thing heretofore suggested for this purpose. It consists of a small silver canula, slightly curved, about five inches long, together with a portion of the mainspring of a watch, filed down to suit the opening in the canula, with one end made of a small silver bulbous point, and the other having an eye. The spring, thus prepared and armed with a ligature, is passed through the canula, previously introduced up the sinus, and through into the bowel, with its end in contact with the finger in the rectum. The spring, when passed into the canula and coming in contact with the finger, will readily be directed, brought through the rectum and drawn out.

That form of fistula occurring on the inside of the bowel, and extending through into the cellular structure, will generally be cured by touching the inner surface with the nitrate of silver; or if it is found upon examination to have somewhat calloused edges, a very slight touching with the oak caustic, and then filling up the orifice with a short piece of candle-wick, allowing the other portion to remain out of the bowel, in order to its more ready removal, will be necessary. This should be repeated every day and the fistula carefully cleansed, and another pledget again introduced. The object of thus filling up the fistula, is to prevent any of the contents of the bowel passing down into it, and thus interfering with the adhesion desired. In making these applications, in this form of the disease, the aid of the anal speculum will be indispensable.

When there is not any considerable irritation in the parts, so as to require the application of a poultice, any simple salve, such as the red-oxide-of-lead plaster, will be all the dressing necessary in the case.

When however, the applications produce irritation and pain, the parts may be fomented, two or three times a day, by the patient sitting over a vessel of hot hops, in addition to the application of the elm poultice. Or a soothing starch and laudanum injection may be used, two or three times a day. Or if the irritation connected with it produces a spasmodic action of the sphincter, the belladonna ointment, heretofore directed in other affections of the rectum, may be used. In making these different applications, it will generally be necessary for the patient to wear a T bandage.

With these measures, efficiently and properly applied, I have no hesitation in bespeaking for you, when you shall have assumed the responsible duties of the profession, very general success in these cases.

PROLAPSUS ANI.

This affection consists in a descent of a portion of the rectum through the sphincter ani; presenting a red or purple, and irritated tumor-like projection below the external orifice of the bowel. In slight cases however, the tumor consists of mere folds of the relaxed mucous membrane, projecting below the sphincter muscle and presenting the appearance of a fungous growth attached to the circumference of the anal outlet. But where the tumor is larger and more projecting, the whole structure of the bowel becomes inverted, accompanied with a more sensible constriction of the sphincter. Instances are mentioned in the books, in which the colon and even the cœcum have been forced through the rectum. These are extreme cases, and may overtax our credulity, yet the extent of the prolapsus differs greatly in different cases; but in most instances the invaginated portion consists only of the mucous membrane.

It is not very common for this difficulty to occur all at once; but it generally comes on by a slight and gradual increase. Where relaxation of the bowel exists, it gradually augments in size until the whole structure of the bowel protrudes. It will at first be observed to consist of a small rounded tumor at the verge of the anus, occurring only when the patient is in the act of defecation; and usually disappearing spontaneously; or it can be returned with little difficulty by slight pressure. If not relieved, it will be found to gradually increase in size, and will require more force and often some assistance by pressure to return it. In this case, if allowed to remain any great length of time, the contraction of the sphincter muscle interrupts the circulation, giving the tumor a dark purple appearance, and would no doubt if not relieved, result in mortification. But it does often remain protruded for a long time, without producing any serious inconvenience. This however is where the inverted portion is confined to the folds of the mucous membrane, and where no great irritability of the sphincter muscle exists at the time.

Though it generally makes its appearance very gradually, yet in some cases the protrusion occurs suddenly, during the act of

defecation, where relaxation of the bowel has previously existed, and often causes great alarm, as it presents a frightful appearance.

The *causes* of prolapsus of the bowel are any influences that produce an undue relaxation of the parts involved. It is a common sequel of chronic dysentery, and sometimes accompanies the acute form of that disease. It is very common among children during their second summer, where great relaxation follows the long-continued irritation of the bowels, attendant upon such cases. The long-continued use of aloetic purgatives, has been followed by prolapsus of the bowel; so also the local irritation produced by worms, especially the ascarides, and by irritating substances lodged in the rectum, has been known to be followed by this difficulty. I have also met with a few cases following the severe straining and pressure attendant upon parturition. This is more apt to accompany those cases in which great atony of the lower bowel has previously existed for some time.

Prolapsus of the rectum is usually accompanied by an irritated condition of the bowels, and if diarrhea is not an attendant upon it, that difficulty is very likely to be developed by any slight occurrence calculated to produce it.

This disease is mainly confined to children, though it sometimes occurs in advanced age and more rarely in the meridian of life.

Treatment.—The treatment of prolapsus ani may be said to be palliative and radical; or that which is necessary to return the invaginated part, and that which is necessary to prevent a descent.

Various methods and expedients have been recommended for the purpose of reducing or returning the prolapsed bowel. In general, where the protruded part consists of folds of the relaxed mucous membrane, the patient, if a child even, unless too young, will be able by slight pressure to return it. At any rate, very little constant pressure by an assistant is all that will be necessary in such cases. So also in the ordinary cases met with, where the bowel proper protrudes, slight, uniform and constant pressure with a soft, folded, linen rag, wet in warm water, will be sufficient to accomplish it. But cases are occasionally seen in which all the pressure that can be safely made, will not be competent to effect its return. And I have found in several instances, the oiled finger even as recommended by Dr. Wood, not to succeed in replacing the bowel, and causing it to remain. For however much you may

oil the finger, the mucus of the bowel possesses the property of adhering to the finger, to an extent sufficient to cause the bowel to follow it, when it is withdrawn. It was in a case of this kind, where every effort had failed in permanently replacing the protruding bowel, that I resorted to the expedient of pressing up before the finger, a soft, oiled rag, and thus succeeded in completely replacing the protruding parts; and after waiting a few moments for the sphincter muscles to contract, was able to withdraw the finger without the bowel following—when the rag was readily removed. You may think this rather an unimportant and trivial matter, but my word for it, you will not think so when all other known methods shall fail you.

After the bowel has been returned, you should keep the patient quiet for a short time, and make gentle pressure, by means of a compress and the T bandage. And the bowels should be kept moderately open with mild aperients, or what is better, if it can be made to answer the purpose, the use of an appropriate diet; such as rye mush and molasses, or what is now a very popular article of diet for such purposes, and I think deservedly so, cracked wheat or "*grits*" boiled, and used similar to rice or hominy. But many of these cases will be accompanied by a constant tendency to diarrhea, which will be necessary to be kept moderately restrained. For this purpose the compound sirup of rhubarb and potassa, in dessertspoonful doses for children, may be given three or four times a day. If this is not sufficient, a decoction of blackberry-root may be used, and will be found a valuable astringent and tonic. It should be given to a child two years old, in doses of a tablespoonful three times a day. Or if a more decided astringent is required, the compound tincture of catechu and paregoric, in equal parts, may be given in teaspoonful doses, as often as may be necessary to keep the bowels moderately restrained.

While these *general measures* are being used, others of a more local character are not much less important. The patient should be directed to guard against straining, when at stool, and to effect this with certainty, defecation should be performed in as nearly an erect posture as possible. The bowel should be freely bathed after every evacuation, especially if it comes down, with a strong decoction of oak bark, and supported by a compress wet in the same, and retained there by the T bandage; changing it sufficiently

often to keep it moist; while the lower part of the abdomen and back should be freely bathed with the same astringent decoction, twice a day, and a small portion of it should be thrown up the bowel with a syringe, three or four times a week. With these measures, perseveringly applied, I have seen many cases of an obstinate character, both in adults and children, permanently relieved.

But an occasional case will be found, in aged and debilitated persons, in which ulceration and unhealthy granulations exist on the mucous membrane of the rectum. In addition to the means just alluded to, the ulcerated points will be required to be touched, even when the bowel protrudes, for a few times, with the nitrate of silver; or the granulated surfaces may be sprinkled over with the powder of the sesquicarbonate of potash, till a more healthy condition is produced. These cases will be benefited by an injection of a decoction of the *hydrastis canadensis*.

LECTURE XXXI.

LOCAL DISEASES—CONTINUED.

Colic: Varieties named. Wind Colic: Symptoms; Cause; Treatment. Bilious Colic: Symptoms; Nature; Cause; Fatality; Anatomical Character; Treatment; Particular Remedy—Dioscorea; Remarks; Other Treatment. Painters' or Lead Colic: Distinction; Symptoms; Paralysis; Chronic; Cause; Remarks; Diagnosis; Prognosis; Anatomical Character; Treatment; Prevention.

COLIC.

In treating on the subject of colic, authors generally describe three varieties. Some recent authorities mention others which are more or less important. But for practical purposes it will suffice to follow the usual divisions.

The first variety is wind or spasmodic colic; the second is bilious colic; and the third is lead or painters' colic. Each of these varieties develops symptoms somewhat peculiar, and requires a different mode of treatment. It will therefore be better to consider the different varieties separately, than to attempt the discussion of them all together.

WIND, OR SPASMODIC COLIC.

This affection occurs among children as well as adults. It frequently arises from over-distension of the stomach by cold substances, such as frozen apples; from articles that generate wind in the stomach; from the fermentation of undigested food; and in infants, from the souring of milk on the stomach. It is very apt to occur in dyspeptic subjects, and is by turns very painful, from the excessive accumulation of gas in the bowels, which is either belched up from the stomach, or passed off by the intestines. It may be caused by acrid secretions producing a spasm of the muscular coat of the bowels when they are in a torpid condition; though this is rarely the case, as the irritation would be likely to increase the peristaltic action, and diarrhea would shortly follow. It may however, be excited by the sudden obstruction of gaseous

accumulations from "taking cold." Repelled cutaneous eruptions are enumerated among the causes, but as this would be likely to produce irritation or inflammation, it may be considered equivocal. It is also said to be produced by translated rheumatism, but this is rather doubtful, as in that case, it would more probably assume the character of bilious colic.

It usually comes on suddenly, and as often suddenly disappears, depending on the course pursued for its relief, on the character of the cause, on the *effects* produced in relieving the system of the offending cause, and somewhat on the peculiarities of the constitution affected. It rarely produces any constitutional disturbance; the pulse is seldom excited, nor are the secretions particularly deranged. The accompanying pain, though more or less constant, is usually paroxysmal. Pressure, in wind colic, rather gives relief; but in inflammation of the bowels increases the pain.

This form of colic is painful while it continues, but rarely proves fatal. In some cases however, the continued irritation which must, more or less, necessarily attend the acrid accumulations, would if not relieved, excite a grade of inflammatory action that might prove fatal. The same result might follow the great distension of the bowels from accumulations of flatus.

The *treatment* is very simple, though this will depend somewhat on the cause of the disorder. If it arises from taking into the stomach a large amount of fruit, frozen or otherwise, or any other irritating substances, or if the patient has taken a full, hearty meal, the most reasonable course would be to give an active and speedy emetic. This will generally afford prompt relief. But if an emetic will not answer every purpose, a brisk cathartic should be administered. The compound powder of senna and jalap is a remedy of great value from its speedy and easy action, though I do not recommend it so often as I formerly did, or as some of our physicians now do. In the treatment of diseases generally, cathartics are not so frequently indicated as they formerly were. Since the prevalence of cholera in 1834, a greater tendency to gastro-intestinal irritation is found to exist. But in this particular form of disease, when the bowels are loaded with acrid accumulations, there is nothing more certain to afford relief than the mild and copious action of the preparation just named. Where the symptoms are urgent, a cathartic injection may also be resorted to, and this may be all that will be necessary, as it frequently affords immediate relief, and gives time for the operation of the physic.

If some anti-spasmodic—such as the infusion of asafoetida, castor oil, spirits of turpentine and molasses—is added to the injection, it will prove more effective and immediate in its action. Fomentations on the abdomen, when the pain is severe, will have a good effect. If however, the pain is intolerable, and the object is to afford temporary relief before the main indication is fulfilled, the compound tincture of Virginia snakeroot or sudorific tincture may be given, and it will generally answer the purpose. Or you may administer teaspoonful doses of equal parts of tinct. opium, tinct. camphor, and essence of peppermint. It will generally be necessary to obtain temporary relief before resorting to more active treatment with children, as they are liable to be thrown into convulsions. The dose of the sudorific tincture should be adapted to the age of the patient; fifteen or twenty drops will be proper for a child fifteen months old, and should be repeated once in two hours till the system is relieved. You may then follow immediately with the compound powder of rhubarb, which corrects the acidity of the stomach and bowels, and often acts as promptly as an anodyne, although it possesses no anodyne property. I have seen children relieved immediately by this means. If great irritability of the stomach exists, sinapisms to the epigastrium and small doses of the neutralizing powder will rarely fail to have a good effect.

BILIOUS COLIC.


Bilious colic is a more serious and formidable difficulty than wind colic. The latter is often mistaken for it, and it is therefore thought to be far more frequent than it really is. In fact, however, bilious colic seldom occurs in a life-time of practice, and this simple fact almost precludes the idea of its being connected with disease of the liver, as the term seems to indicate. We so often find both functional and structural disturbances of the liver, that it would seem, if bilious colic were dependent on disease of that organ, it would be more common. At the same time, I do not deny that the liver may become involved, that it may be too active or torpid, during the progress of this disease. But its rare occurrence in this country, and the fact that all the cases which I have treated,—being only some three or four in twenty-five years' experience,—were promptly and permanently cured by a remedy which produces no cathartic action of the bowels, and no apparent action of the liver, have satisfied my

mind that it is not in any way necessarily dependent on hepatic disturbance.

Bilious colic is sometimes preceded by symptoms resembling those of the forming stage of our autumnal fevers; derangement of the stomach; sense of weariness; loss of appetite; a furred tongue, and feelings of more or less debility. There is constant pain during the whole progress of the disease, aggravated by regular paroxysms of increased suffering, and amounting between the paroxysms, to uneasiness rather than pain. This is at first located in the centre of, but gradually diffuses itself over the entire abdomen; and is accompanied by febrile reaction, which constitutes a marked difference between bilious and wind colic. This febrile state of the system is preceded by a chilly sensation, and is attended with frequent pulse, dry skin, furred tongue, and bilious vomiting. From the latter symptom the name of the disease is derived. But the vomiting at first is not of a bilious character. It is only after the contents of the stomach are discharged, and the nausea continues, that bilious matter is thrown up. The effort of vomiting often produces a regurgitation of bile into the stomach. The tongue is usually covered with a whitish coat, which as the disease progresses, becomes thicker and more yellow.

The abdomen is distended, and in the latter stage of the disease is tender and painful under pressure, which you will remember, is not the case in spasmodic, or wind colic. Febrile symptoms are common to bilious colic and peritonitis. But they may be distinguished by the absence of bilious vomiting and paroxysms of pain in the latter, although vomiting occurs in peritonitis, when inflammation exists in the peritoneal covering of the stomach. The reliable symptoms are the severe paroxysms of pain, uneasiness and restlessness in this disease, and their absence in peritonitis.

In regard to the *nature* of the disease, but little can be said with any certainty, and in such cases, I am inclined to think it is wise to say but little. When I have no opinion I desire to express none, and in this case, the best I can do is to give the opinion which I have formed from reading and reflection, and a limited experience in this disease. It is my impression that bilious colic is really a nervous disease, and that the essential difficulty is spasm of the muscular coat of the bowels. My reason for this opinion is based upon the results of treatment and post-mortem developments. I have seen bilious colic continue after copious evacuations of the bowels had been procured. If then the accumulations in



the bowels were the cause, why did the symptoms continue? Or if the biliary secretion was the cause, why did not the symptoms subside when that accumulation was discharged? But so far from this, all the cases which I have treated were relieved without any evacuation of the bowels, till after the spasm had completely ceased. If I was not in possession of the remedy which I will soon describe, I should administer powerful antispasmodics.

The most common *cause* of bilious colic is exposure to sudden changes of temperature, when the system is predisposed to the existence of irregular neuralgic disease. By such exposure the neuralgia is suddenly transferred to the muscular coat of the bowels, and a spasm is the consequence. The natural peristaltic motion of the bowels is thus arrested, and the biliary secretion, which should pass down into them and perform its office in the process of digestion, is retained in the duodenum. From the effort of that organ to rid itself of the offending irritant, which is completely barred from a downward passage by the spasm, it is carried up, by the inverted peristaltic motion of the duodenum, into the stomach, and is thence thrown up by vomiting. This course continues until the spasm of the bowels is relieved and the secretion from the liver resumes its natural direction. So also any other circumstance calculated to bring on a spasm and the consequent obstruction, may develop this disorder. It may in this way follow translated rheumatic affections, or other nervous diseases. The opinion therefore that it is produced by vitiated bilious secretions is, undoubtedly, erroneous. For in cases of overaction of the liver, and consequent discharge of vitiated bile into the bowels, the effect would be irritation of the mucous membrane and consequent diarrhoea. This view of the subject is compatible with the soundest induction from the facts of the case, and is fully sustained by the phenomena of the liver already described.

The fatality often attendant on the drastic-cathartic course, which prescribes the whole array of purgatives, from senna and manna, through the long catalogue of oil and turpentine, calomel and jalap, aloes and scammony, croton oil and elaterium, and finally to cap the climax of folly and empiricism, large doses of metallic mercury, is strongly confirmatory of the views which I entertain, and upon which I predicate the treatment which I have to recommend. I am convinced that very few cases would prove fatal, with proper treatment. High febrile action, rapid pulse, sallow complexion, a greatly swollen condition of the bowels, extreme

restlessness and continued constipation, would be portentous of evil—especially if these symptoms were apparently increasing; while an amelioration of the general symptoms would indicate favorable results.

The *anatomical developments*, owing to the comparative rarity of the disease, and the few opportunities consequently afforded for post-mortem investigations, are less perfectly understood than could be desired, and our knowledge is therefore too limited to form an adequate opinion of its true character. We may suppose however, that they would be as different as the causes producing it. So far as they have been observed, the appearances very satisfactorily sustain the views which I have set forth in accounting for the symptoms of the disease. If it should appear that the passage could not have been obstructed by intus-susception, nor by inflammation arising from an impacted condition of the bowels, then it would be evident that the “obstruction must be caused by some derangement or deficiency in the action of the muscular coat of the intestines.” And this accords with the developments which have been observed. A considerable portion of the bowels is usually found presenting a “cord-like contraction” below a distended portion, which has evidently resulted from the accumulations produced by the obstruction. All cases terminating fatally will have more or less evidence of inflammatory action, as a necessary consequence of the continuance of the obstruction. This is inevitable and has been uniformly observed.

The remedy upon which I rely in the *treatment* of bilious colic is *dioscorea villosa*. I have used it with entire success in all the cases that have come under my care. In one case that had been previously treated forty-eight hours with injections, fomentations, anodynes and cathartics, without success, the patient was relieved in half an hour by taking one dose of dioscorea. In another case, to which I was called in the night, the patient, who had been suffering severely for twelve hours, was perfectly relieved in a few minutes, and soothed into quiet sleep. It has never been known to fail, and I should rely upon it with entire confidence in all cases of this disease. The philosophy of its therapeutic action may not as yet be fully understood or clearly explained. That it is eminently adapted to the case is very certain, and *that* after all, is the main point in practice. You may be interested to learn, that the knowledge of its virtues was in possession of the same old German, who has given name to the Bones’ Bitters, and who was also

famous in his neighborhood for the treatment of bilious colic. The recipe was obtained from him by a medical student, whom he had successfully treated in that disease, after he had been given over by other physicians.

The plant is commonly called *yam*, and is a very modest and interesting little vine, with perfect cordate and nerved leaves, of a light green color. Once seen, it will rarely be forgotten or mistaken. The root lies horizontally just under the surface of the ground, and is of uniform size, both ends appearing truncated. The vine shoots from the body of the root at different points, frequently three or four from a single root. The root is woody, varying in size, from that of a goose quill to half an inch in diameter, and is from six inches to one and a half feet in length. About an ounce of the root is made into a decoction in a pint of water, and half of this quantity is given at a dose.

If you have not this remedy at hand, it is important to know what is next best. I would not advise an active purgative treatment till the spasm of the intestine is relieved. This may seem to be the first indication; still, if it be a well-defined case of bilious colic, I should first of all relieve the spasm, and then the bowels will often act without much assistance. You can not expect to derive benefit from purgatives, until the principal difficulty is removed. And for this purpose I should give powerful antispasmodics and active diaphoretics, with counter-irritation over the bowels. *Asafotida*, with the sudorific tincture, may be given in drachm doses, and repeated once in two hours, till the patient is relieved; or if the stomach is irritable, the preparation may be administered in the form of enema, and a pill of *asafotida* and gum opium given in doses of two grains each, and repeated every two hours. In severe cases, I should have no hesitation in administering chloroform in sufficient quantity to produce its full effect, at least when the *dioscorea* could not be obtained. When the measures first resorted to fail, the aperient recommended by Dr. Abercrombie, being an excellent antispasmodic, might be used with the prospect of favorable results. He recommended small doses of *aloes* and *hyoscyamus* frequently repeated. If all these means should fail, more active measures would be worthy of consideration. In such cases, I should be inclined to administer *quinia* and opium, and from theory merely, would advise you to try it, especially in the western country. Cupping over the bowels, when inflammatory symptoms existed, might also be resorted to,

at any time during the progress of the disease. I have also seen excellent effects produced, when there was severe pain connected with fever, by applying a large folded towel wet in cold water, and repeated once in three or four hours, or as often as it begins to get dry.

An old-school physician of great respectability and skill, from Connecticut, informed me, that he had a remedy which had proved successful in this disease. It is very similar to the remedy called by Dr. Beach "Hull's bilious-colic physic," and is composed of warming aromatics and active physic. The prescription is as follows:

R. Mace,
Cloves,
Ginger root,
Nitrate of potass,
Gum myrrh,
Saffron,
Cinnamon, *ad* 3ij.
Aloes, 3ij.


Pulv. Mix. Dose 30 grs. every two hours.

It will be perceived that this prescription is a stimulating aromatic purgative, and I have no doubt, might have the effect of quieting the irritability of the stomach, and relieving the spasm of the bowels. At the same time, its cathartic properties would be likely to increase the peristaltic action, and thus answer the two-fold indications of the case.

LEAD COLIC.

The *third* variety of colic is variously denominated *colica pictorum*, or *painter's colic*, and *saturnine* or *lead colic*. It generally comes on very gradually, perhaps as much so as any other disease. It is supposed, and in fact known, to be produced by the slow action of a specific poison. Before any of its local symptoms are fully developed, there will be, for some days, more or less depression of the nervous functions, despondency, mental debility, and a disinclination to either mental or physical effort, with a feeling of wretchedness and gloom. If it should be the first attack, the patient will scarcely suspect the cause of his symptoms, or be aware that they are the premonitory encroachments of this disease.

The first symptom of positive derangement is a sense of weakness, a sinking, collapsed feeling in the epigastrium,—a symptom



peculiarly characteristic, and appearing before any positive pain is developed. This uneasiness, first felt in the epigastrium, gradually extends down into the umbilical region. It finally increases into distinct pain, described as a kind of twisting sensation, similar to spasmodic action. And it is found that the bowels really are in a state of permanent muscular contraction, and the intestines in a positively twisted condition. Nausea is among the early symptoms, and sometimes, though not often, increases until vomiting follows. The ejections however, are not of a bilious character, but are merely the natural contents of the stomach.

Before the disease is fully developed, the patient has a constant desire to evacuate the bowels; yet his efforts to do so are entirely ineffectual, for they are almost always obstinately constipated. A physical examination of the bowels shows a very different condition from that of any other form of colic. In the other two varieties, there is usually a full, and in many instances, tympanitic condition of the abdomen, while in this you find precisely the reverse. And it may be regarded as a diagnostic symptom. The bowels are retracted, with a hardened and tense condition of the parietes. The testicles are not unfrequently drawn up, and the irritation often extends to the neck of the bladder, producing difficult urination. The tongue exhibits a very peculiar appearance, differing from that in almost all other diseases. It is very little furred, but appears bleached, or white, and is soft, relaxed and flabby, while in bilious colic it is thickly coated. The urine is always scanty and sometimes almost entirely suppressed.

The pain, described as being of a twisted nature, is not aggravated by pressure, and you will remember it is in bilious colic, while in wind colic it is relieved. This peculiarity, with the retraction of the intestines, will enable you to distinguish lead colic from the other varieties. You will bear in mind however, that in the last stage of the disorder, when fatal inflammation has set in, a tympanitic condition of the intestines will be found, which might be mistaken for some other disease of the bowels. Inflammation is not a necessary attendant on lead colic, but where it is complicated with inflammation, you would naturally expect to find the abdomen in a tympanitic condition, and such is the case. Post-mortem examinations do not usually show positive disorganization; yet we occasionally find it present, though it is not diagnostic.

Paralysis of some part of the system is sometimes an attendant symptom. Sometimes it is confined to one arm, sometimes to a

lower limb, and in some cases the tongue is completely paralyzed. The authorities speak of a form of paralysis, which is considered to be the result of the poisonous influence of lead, and is confined to the forearms. I have seen cases of this kind.

Beside these general symptoms, there are others quite uniformly attending the disease. Patients almost always complain of a severe pain in the small of the back, which they suppose results from the pain in the bowels, but which in fact is precisely the reverse. In such cases you will find tender spots along the spine. Perhaps there is no malady in which restlessness is a more troublesome symptom. The patient experiences a constant uneasiness and a desire to change his position. He gets up and walks about the room, gets on his knees, stretches himself across a chair, and assumes the most unusual and grotesque attitudes. These manueverings may seem ludicrous and uncalled-for to the looker-on, but the patient is earnestly seeking temporary relief from his intolerable uneasiness and distress. The pain is more or less constant, but more severe in paroxysms, and in this respect is similar to other forms of colic. If the patient vomits freely, there is a complete temporary subsidence of all the urgent symptoms; yet the sensation of extreme weakness continues, and the respite from suffering is only transient. Patients usually complain more at night than at other times; not probably because there is really an aggravation of the symptoms, but they find less to divert their attention from their own sufferings, and time wears heavily away in the silence of night.

The pulse is usually slow and hard, and if inflammation sets in, becomes affected as in other inflammatory diseases. The skin over the whole surface is exceedingly dry and parched, but not hot, while the extremities are decidedly cool. But if the disease is complicated with active inflammation, or febrile action, you will find the skin hot and dry, and the pulse frequent, small, tense and hard, according to the constitution of the patient. The countenance in all cases is sunken, exhibiting marks of extreme suffering, and in some instances having a dark grizzly appearance. I have already remarked that constipation is generally attendant. Where the operation of medicine is procured, the evacuations are very peculiar, having a dark or green appearance, and being usually found in lumps, thus showing a contractile and spasmodic condition of the bowels.

Lead colic occasionally becomes chronic. Nutrition is then

impaired, a constant uneasiness is experienced in the abdomen, and the whole system becomes emaciated. The poisonous influence of the lead continues to operate until the secretions are disturbed, and every function of the body is performed imperfectly.

As to the *cause* of the disease, very little need be said. The name itself implies that it arises from the poisonous influence of lead on the system. This influence may be communicated in various ways. Persons have been known to take the disease by drinking water caught on the roofs of houses covered with lead, and also from eating fruit preserved in vessels lined with lead. But the most common cause is the absorption of lead through the skin and lungs, and the most common subjects are painters, glaziers, and manufacturers, who are frequently brought in contact with the article in some of its preparations. In places where these preparations are extensively manufactured, it is a very common disease, so much so as to be considered endemic, and indeed it is thought by some to be occasionally epidemic. But I can not conceive how a disease, acknowledged by all to be produced by a local specific poison, can properly be considered epidemic. It may be that an epidemic influence would predispose the system to be more readily affected by a local poison, but it should not, therefore, be said that it is an epidemic disease.

Great improvements have been made, within a few years, in the processes of lead-manufacture. The fumes of heated lead, are perhaps the most prolific cause of the disease, and the chief improvement, I understand, consists in an invention by which this cause is obviated. But I regret to find, on visiting the manufactories in this city (Cincinnati), that this improvement has not been introduced, and that lead colic is very common among the workmen. If motives of philanthropy were as strong as the instinct for "making money," the occasion for this remark would not long exist.

You will readily have observed that the *diagnostic* symptoms are, retraction of the bowels, with a hard and sometimes knotty feel, without tenderness; paroxysms of pain; a cool skin and unexcited pulse. In addition to this, the history and circumstances of the case will naturally suggest the nature of the disease. If the patient is engaged in the manufacture of lead, or follows the occupation of a painter or glazier, or is otherwise brought in contact with the poison, and has the symptoms just described, we would be justified in concluding that it was a case of lead colic.

The *prognosis*, as a general thing, may be considered as favorable.

In a large majority of cases, when the cause is removed, the system will be able, without the assistance of further medicine, to recover. But a proper course of treatment will certainly shorten the disease in its course, and save the patient from a vast amount of suffering.

In regard to the *anatomical* developments, little can be said, as pathological researches have not thrown much light on the subject. The bowels, and especially the colon, are often found almost closed up by the muscular contraction, though they exhibit no traces of local inflammation. The nervous system has been carefully examined, and in some cases the brain and spinal marrow have been found seriously involved, while in others they exhibit no traces of disease. But since we find cases of local paralysis, depending on the disease, it is reasonable to suppose that the poison acts on the nervous system.

In the *treatment* of this disease, the indications are to mitigate the immediate sufferings of the patient, and eliminate from the system the poison that produced the difficulty. The remedy which I am about to recommend for this purpose, was at first used empirically, like nearly all others. But the theory of its operation is exceedingly plausible, and its action, so far as my experience goes, fully sustains the theory. And I think that a careful analysis of its operation and effects will recommend it to any physician, and especially to the chemist, as admirably adapted to fulfill indications.

We have, then, in our Pharmacopœia, a remedy called *White Liquid Physic*, the formula of which is as follows:

R Sulph. magnesia, ʒxj.

Nit. potass., ʒss.

Sulph acid, ʒj.

Boiling water, Oij. Mix.

This prescription is administered with a view to neutralize the poison, and act as a purgative. Admitting that the system is poisoned by the absorption of lead, you will perceive on a moment's reflection, the operation of this remedy. It contains an excess of free sulphuric acid, which unites with the lead, and forms the sulphate of lead—a harmless and insoluble salt. If it be asked how the sulphuric acid can reach the lead, the answer is perfectly simple and philosophical. For if it is reasonable to suppose that the dry lead is absorbed into the system and circulates in the fluids of the body, or remains stationary in certain parts, it is even more reasonable to suppose that the liquid antidote may be absorbed and circu-

late in the same way, and thus reach and combine with the lead in an inert compound. It is generally admitted by the profession, that other medicines are absorbed into the circulation when taken into the stomach, or otherwise brought into contact with the system. So it is with this. The sulphuric acid is absorbed, and being carried through all the ramifications of the circulating system, sooner or later comes in contact with the lead, in whatever form it exists, whether as the carbonate, acetate, or any of the oxides, and, having a stronger affinity for that metal than any of the acids with which it may be combined, unites with it to form the inert sulphate, which can be thrown off at leisure.

This remedy should be given in tablespoonful doses every few hours, until a full and free action of the bowels is produced. The sulphate of magnesia, which it contains, will act as a cathartic, removing effete matter. After a thorough evacuation is obtained, the medicine should be continued in smaller doses, to keep up a gentle action of the bowels, and give time for a thorough absorption of the acid.

If it should be necessary to aid the cathartic action, you may resort to the use of liberal lavements with a tube and pump. By this means you will secure an evacuation of the lower bowels, and thus give the contents of the upper portion of the intestines room to settle down. The common stomach-pump, which you will find in most apothecary shops, will answer every purpose. The injection, in this case, should be of a cathartic character, instead of simple water. I have used the compound powder of senna and jalap, in double doses, and usually with good effect. Castor-oil, turpentine and molasses may also be used. A weak solution of tobacco—say a drachm to a pint of water, and one-half at a time—is another remedy; but you should be very cautious in administering this article, as it often produces the most alarming symptoms—nausea, cold sweat and extreme prostration.

When the sufferings are very severe, it is important to relieve, as much as possible, the urgent symptoms. For this purpose, I would recommend a preparation of morphine and asafœtida, which is an excellent antispasmodic. You may also apply hot fomentation over the abdomen. You can not expect the cathartics, or any remedy, to give immediate relief. The cure must be effected gradually, and you should therefore palliate, as much as possible, the sufferings of the patient, while the main curative remedies are operating for the removal of the cause of the disease.

When I have found it desirable to mitigate the pain in the small of the back, I have been in the habit of applying a cup to the tender spot, with decided benefit.

Since we find in this disease palpable derangement of all the secretions, it is of the highest importance to induce free perspiration. By this means the secretory organs will be opened, a large amount of matter, embarrassing to the system, and productive of injury, will be thrown off, and patients rendered more calm and easy. If the morphine and asafœtida, do not act in this way, to the extent desired, you may administer our sudorific tincture in conjunction with some mild diaphoretic tea. In this connection I will mention another article, which may be used to fulfill the above indication, and which also has a high reputation as a curative remedy. It is the *nepeta glechoma* commonly called *ground irt*, or *Gill-over-the-ground*. I have been told by a number of painters of considerable intelligence, who were subject to lead colic, that they have used the article with complete success, both in warding off the disease in its early encroachments, and curing it when fully developed. It is a modest little plant, found in almost all the woods and bottom-lands of the West, and is given in decoction.

Alum has been recommended as a curative measure, by some of the highest authorities. Dr. Eberle and Dr. Wood have both used it with prompt success, in cases which "had resisted mercurial treatment." And yet Dr. Wood calls in question its *modus operandi* on the cause of the disease, without giving, as you will observe, any substantial reason for so doing. Whereas, the fact is well known, that the sulphuric acid contained in alum has a stronger affinity for lead than it has for alumina, and it requires something more than Dr. Wood's mere dictum to set aside the theory that this acid can "follow the salt of lead in its course through the system, and change it wherever overtaken, into the sulphate."

A few words in regard to prevention. It is as much the duty of the physician to prevent disease, when he can, as to cure it. You should caution your patients not to allow lead to come in contact with the skin. And indeed you will often see painters and other workmen, who are prudent, using the precaution to slip on a suit of overalls, protect the hands with gloves, and bathe every night in greatly diluted sulphuric acid. They should especially wash their faces and hands two or three times a day when at work, and also be careful, when working in rooms, to have a free circulation of air. It is probable that the turpentine, with which the lead is

mixed, renders it more easily absorbed. People should therefore be warned against going into or living in houses newly painted. I have in a number of instances, been called to see whole families, who were suffering from nervous diseases occasioned by sleeping in such houses. The symptoms in such cases are usually, nervous excitement, pain in the back and head, with slight nervous fever, and some uneasiness at the stomach. Removal from freshly painted rooms if possible, thorough ventilation at all events, attention to the diet, and mild evacuants, giving the preference to lavements, and proper diaphoretics, will generally be all the measures necessary in such cases.

LECTURE XXXII.

LOCAL DISEASES—CONTINUED.

Obstruction of the Bowels: General Remarks; Symptoms; Causes; Treatment; Concluding Remarks. Constipation: General Remarks; Symptoms; Causes; Treatment; Case stated; Diet; Treatment of Obstinate Cases.

OBSTRUCTION OF THE BOWELS.

In connection with the subject of colic, I desire to detain you a short time in making a few remarks on a subject allied in some respects to those we have just been considering. *Obstruction of the bowels* often results from other causes than those connected with colic, and it is to these difficulties I desire to call your attention at this time.

Those cases resulting from an impacted condition of the colon, generally come on slowly, and without manifesting any particular symptoms for some time. The extent to which the bowels sometimes become impacted is almost incredible, and is accompanied of course with loss of action of the bowels, and with more or less dyspeptic symptoms. In some cases it is said, individuals have gone for months without having a passage. In cases of impacted colon, when measures, such as injections, have been taken to procure a passage, the entire contents of the bowel below the obstruction may be brought away without affording relief.

The symptoms that usually accompany these cases are, more or less local pain; the tongue generally furred, being covered with a white coat; a bad taste in the mouth; a feeling of general debility, and the skin dry, though without any febrile symptoms as shown by the action of the heart. The stomach also sooner or later sympathizes, and becomes irritable, and sometimes there is vomiting of bilious matter. It is said that in some cases stercora-ceous matter has been discharged in this way, where there was obstruction merely from accumulation. If the accumulation is great, more or less distension of the abdomen will be observed, and always upon examination a feeling of irregularity will be dis-

covered in the region of the colon, and often very sensible at some particular spot. This I have seen in a number of cases; in some instances the hardened and impacted accumulations could be distinctly felt in the right groin, at or near the head of the colon; while in other instances it was found equally distinct in the opposite side, at the other end of the large bowel. These cases however, exhibited symptoms of inflammatory action, produced evidently by the accumulations, since the symptoms subsided entirely upon their removal. Associated with the general symptoms of fever, was a sensible pain, and great tenderness upon pressure at the point of the accumulation. Generally in cases of obstruction in the colon, unless inflammation is excited, there is but little general disturbance, nor does the stomach become greatly affected, except with the less-marked symptoms of indigestion. Cases are related in the journals and books, of individuals who have had but one or two evacuations from the bowels in a year or longer, without apparently suffering materially in health or comfort.

Permanent obstruction of the bowels, may result from tumors originating in the mucous or muscular coat, thereby preventing altogether, or in part, the free passage of their contents. This condition of things will generally be manifest by the gradual manner of its occurrence, and from the general and constitutional symptoms which such a state of the system would naturally excite. Of this character, cancer is supposed to be the most common, and when this is found to be the nature of the case, it is of course hopeless and incurable.

But the most common cause of obstruction, except that which depends upon mere accumulations, and by far the most singular cause, is found in the invaginated condition of the bowels. This is called intus-susception or invagination, and by some of the authorities, ileus. This is a mere introduction or falling in of one portion of the bowel into another. It usually takes place from above downward, but I believe cases are mentioned where the reverse has been found. It occasionally occurs in the progress of bilious colic, from the spasmodic action of the bowels usual to that disease. It is supposed to be possible that this invagination may occur in almost any portion of the bowels, but the usual point at which it is found, is at the union of the small with the large intestines. The peculiar arrangement of the intestinal tube, at this particular point, affords a reasonable explanation for its greater frequency there than elsewhere. But I have myself observed it

at the sigmoid flexure of the colon. An illustration of the particular manner in which intus-susception takes place, is very well shown in a common complaint among children, which I have also frequently seen in adults, to wit: prolapsus ani. Here it will be observed as a natural fixed point, made by the sphincter muscles, at the lower extremity of the intestines, and from the loose and relaxed condition of the bowels, together with more or less spasm of the muscular coat immediately above this point, the portion above the sphincter is forced through that opening, during defecation, and protrusion of the irritated bowel is the consequence. From the obstruction of the capillary vessels, caused by the stricture from the spasm at the invaginated point, gangrene and sloughing are very likely to follow. When this does occur, death is the usual and natural consequence, though a few cases have been observed, where adhesions had formed between the opposing surfaces of the intestines thus invaginated, while the slough was thrown off and discharged from the bowel.

The stercoraceous vomiting has generally been considered the main diagnostic symptom of intus-susception of the bowel. But since it has been known to accompany cases of obstruction arising from other causes, it can not be relied on with entire confidence. Yet it so rarely occurs from other causes of obstruction, and is so invariably connected with intus-susception, that its presence as a general thing, is even more than *prima facie* evidence of this difficulty. It should not however, be relied on exclusively, since other evidences confirming this conclusion can be easily recognized. When this symptom occurs in the progress or at any stage of bilious colic, it may be reasonably concluded that intus-susception has taken place. So also when it occurs suddenly, without any previous indisposition, or when it follows the operation of a cathartic administered for an ordinary disease, and at the same time, a fixed pain with a distinct tumefaction, and more or less tenderness at some point in the track of the colon, can be perceived, the existence of intus-susception would be reasonably inferred.

The case reported by Dr. Bigelow, of Hon. Hugh S. Legare, then Attorney-General of the United States, under the administration of Mr. Tyler, was a remarkable instance of obstruction from twisting of the bowels. This took place at the sigmoid flexure of the colon. The spasm of the bowel had partially drawn the sigmoid flexure into the right hypochondrium, and the bowel had become so twisted as to present a firm cord or neck to the

twisted portion, and upon untwisting it, it was found that four turns had been made, or "two entire revolutions."

The most common *cause* of obstruction from an impacted condition of the colon, is sedentary habits, or long-continued confinement, or it may depend upon inactivity of the bowels, growing out of indigestion or chronic affections of the liver. Obstruction may also be produced by solid concretions, such as gall-stones, or by the long-continued and daily use of calcareous substances, or by the frequent use of preparations of magnesia, taken for a long time as physic. Nuclei may be formed out of some solid substance accidentally swallowed, around which the secretions from the liver and other glands, tributary to intestinal accumulations, may form concretions, which will be gradually increased till obstruction to the bowels occurs.

The most common cause of obstruction, produced by invagination, I have no doubt, will be found connected either with a rheumatic or gouty condition of the system. The few cases of this description which have come under my observation, have all resulted from a sensible and sudden translation of rheumatic affections to the intestines. And I have little doubt, that if intussusception had not suddenly occurred, the disorder would have resulted in bilious colic.

Treatment.—In cases of obstruction of the bowels from accumulations in the colon, the only indication presented will be a free discharge from the bowels. This may in some cases be accomplished to a satisfactory extent, by the use of a stimulating and purgative injection. If this should not be adopted, or if tried and found unsuccessful, a free and speedy cathartic should be given. The compound powder of senna and jalap is well adapted to fulfill this indication; and it may be aided, when the bowels are found unusually torpid, by an injection of a double portion of the same powder, or if preferred, four ounces of castor-oil, a drachm of spirits of turpentine, and a sufficient quantity of warm water. This may be thrown far up the bowels by means of a gum tube and a stomach-pump. If the bowels fail to respond to these several calls upon their dormant energies, you might then administer one grain of podophyllin and two of leptandrin, repeated every four hours, till their cathartic action is produced. These means, or such of them as the circumstances of the case seem to indicate, will rarely fail to afford relief.

In cases of obstruction of the bowels dependent on intus-suscep-

tion, it will be worse than useless to attempt to force a passage with active cathartics; as in that case the action of the purgative only adds to the exciting spasm, and greatly diminishes the chances of relief. The indication in these cases is not so much to procure an operation of the bowels, as to relax the spasm and to relieve the invaginated condition, when the natural peristaltic action of the bowels will generally be sufficient to secure their evacuation. This indication will generally be fulfilled by the use of large quantities of antispasmodic and cathartic lavements, thrown far up the bowels with the force-pump and tube, and by the internal administration of mild, aromatic, anodyne antispasmodics and aperients, together with applications of fomentations to the abdomen, or the use of a large cup, such as a very large tumbler with the air exhausted by a lock of light burning cotton, or some other similar application, such as the exhausted receiver, applied immediately over the seat of the obstruction. This, by drawing up into the exhausted vessel a large portion of the integuments, would tend to relieve the internal viscera of the superincumbent pressure, and thereby favor the internal expansion, and make more direct room for the invaginated bowel to be drawn out. It has been found in a number of cases to afford immediate relief. The injection should be composed of a solution of ten grains of the extract hyoseyamus, an infusion of a drachm of asafoetida, and a gill of castor-oil, in a sufficient quantity of warm water to fill the bowel as full as it will hold. It should be repeated if it comes away. This measure is probably more reliable and more frequently successful than any heretofore used. There is no probability that fluids thus thrown up the bowel with whatever force, or however far short of the head of the colon, can pass the ileo-cæcal valve. But it is not only possible that the bowel below the obstruction may be so far distended, with a warm, soothing and antispasmodic fluid, as to draw down the head of the colon, and thus leave the invaginated portion, but it accords with experience and sound philosophy and has been done in many cases. I have myself seen two well-marked cases, resulting from translated rheumatic affections, in which stercoraceous vomiting had existed for a number of hours, very speedily relieved, and the patient finally restored by this measure. It should be accompanied or preceded, if the case is not an urgent one, especially when the stomach is very irritable, by small doses of the compound powder of rhubarb, with a sinapism to the stomach, repeated every hour, till the irritation of the

stomach is relieved. It may then be increased to an extent sufficient to correct acid secretions, and moderately and quietly increase the peristaltic movement of the bowels. It thus tends to divert and relieve the spasm, while at the same time, it secures the constant fluidity of the contents of the bowel above the invaginated portion, and in this way keeps up a condition of the parts involved exceedingly favorable to relief.

Tobacco injections have been resorted to in this affection, but from all I can learn in relation to it, the practice has not won for itself that favor which its early advocates seemed to claim. It is a most potent remedy and should be used with great care. I have never used it in this affection, but have seen it used in one or two other cases, in which it exerted a powerful influence, producing nausea and vomiting, accompanied with extreme prostration; a mere thread of a pulse, and a cold, clammy sweat; in each case the patients recovered from its effects. It is safe to make a decoction of a drachm in a pint of water, and use half of it at a time.

In cases attended with severe suffering, resulting from the spasmodic action of the bowels, it may be necessary to administer pretty large doses of opium. The objection to the use of opium in cases of obstruction from torpor of the bowels or an impacted condition of the colon, does not exist in spasmodic cases. On the contrary, it is one of the best antispasmodics that can be given in such cases. Almost every practitioner has his favorite preparation of this drug. But its general influence on the system is, no doubt, nearly the same, whatever preparation may be used. In combination with other therapeutic agents however, important indications may be fulfilled, which can not be by the simple remedy alone, without in the least impairing the specific action of the opium. The compound powder of ipecac. and opium is perhaps the best preparation in these cases, and should be given in ten grain doses every two hours, till the object is attained, or the specific effects of the opium are produced.

Many valuable lives doubtless have been saved by persevering efforts of the physician, and you should not abandon your patient, though disappointed in your expectations, in the administration of your favorite and most successful measures. If therefore, you have administered one after another of those remedies, which reason and experience alike suggested, till you have gone through with all your reliable measures; still, if the patient is not evidently *in articulo mortis*, you should not abandon the case as entirely

hopeless. I have stood over patients, in many instances, when but few rays of hope were left to encourage to perseverance, and while the friends were almost disposed to censure me for the administration of medicine, and have in such hopeless cases, so frequently been rewarded by seeing my patient revive and finally recover, that I can not too earnestly impress upon your minds the importance of hopeful perseverance. After every thing else has been tried in vain, and there appears to be otherwise no hope, the abdomen might be opened, and the twisted or invaginated state of the bowels relieved. This has been successfully performed in a few instances, and when the constitution is otherwise healthy and in good condition; I should have no hesitation in recommending the operation as not only practicable, but by no means to be omitted.

CONSTIPATION.

I propose, in the present lecture, to confine my observations to that habitual form of constipation which is dependent upon a want of that regular action of the bowels necessary to health, which is not connected with any other affection, and does not produce any special symptoms of active disease. This course is rendered proper, since we have already considered, or shall hereafter consider, the various affections in which constipation is a prominent symptom.

In prescribing for a case of this kind, it is necessary to take into consideration the habits of the individual, and the character of the evacuations. Only a small portion of what an individual, in health, takes into his stomach, if the requirements of the system are regarded, is destined to be evacuated by the bowels. The amount thus removed, is made up in a great measure of those effete and waste materials which every system, in a healthy condition, daily eliminates for the purpose of that constant change and removal necessary to perfect health. If therefore an individual takes but a moderate quantity of simple food, and it is ascertained on particular inquiry, that his evacuations are of a healthy character and of proper consistency, though they should not be as frequent as might otherwise be necessary, it would not be best in such a case to interfere: as I have generally found the attendant circumstances show that there is sufficient elimination of waste material through the other excretories of the system, the skin, kidneys and lungs, to admit of perfect health. I have witnessed cases of this kind in numerous instances, among adults, as well as children. I have often seen the healthiest and most robust children have evacuations

only every other, or every third day, while the discharges from the bowels were not costive, and were otherwise of a healthy character. In such cases, the greater part of the food is appropriated, and leaves but a small amount to pass off with the effete matter eliminated from the glands about the bowels. It may thus be seen that the regular diurnal movement of the bowels, so essential to a perfect state of health in a majority of individuals, may be greatly varied without impairing the healthy condition of the system. If the statements made by some of the authorities are reliable, the extent to which the systems of many individuals can tolerate costiveness, without any apparent evil effects, is truly astonishing. In recurring to my own experience, I can account for the apparent good health which such individuals enjoy, only on the theory of the vicarious or substituting action of other organs of the body. But, although the evidences of derangement are not immediately manifested to any great extent, in such cases, yet subsequent observation will generally show that the system will, sooner or later, suffer penalties usually proportioned to the extent of the violation of organic laws. Hence it is no unfrequent occurrence, that systems thus disordered are afflicted with rheumatic or gouty disorders, or "blessed" with a succession of boils, or chronic ulcers, or other anomalous eruptions. Individuals who are having evacuations from the bowels only once in three or four days, or as many weeks, to say nothing of double and treble that number of *months*, as stated by some of the authorities, should be admonished that the habit is fraught with peril.

In this form of constipation, although it is unconnected with organic disease, and though no general acute symptoms either of functional disorder or nervous suffering are present, the system becomes so far deranged as to manifest an evident abnormal state in many of its functions. Thus a coated tongue, and bitter taste in the mouth, will generally be complained of. Sometimes there is nausea, and a sense of fullness in the stomach and bowels, with sour eructations, borborigmi and vertigo, frequent turns of headache, foul breath, an offensive state of the other excretions, and often a strong urinous smell, and a dry, harsh state of the skin. If the bowels are not greatly distended with flatus, a hard, uneven condition, especially in the course of the colon, will be felt.

If the inconveniences of all these abnormal derangements, with the general contaminated state of the system which is sure to follow, were all the evils that grow out of a habit of long continued

constipation, the reasons for the removal of the difficulty would not urge themselves so forcibly upon us. But where experience teaches us that this state of the system lays the foundation for more serious and formidable diseases, such as enteric febrile disorders, hemorrhage of the lungs and bowels, hemorrhoidal affections, and stricture of the rectum, dyspepsia, apoplexy and epilepsy, and many other affections, it becomes a matter of no light consideration.

Beside these diseases of the physical system, the moral and intellectual faculties are probably no less frequently disordered. Hence, melancholy and hypochondriasis, with an attendant metamorphosis of temper, and even mania, are common in this disease.

Constipation, like many other affections, appears sometimes to be hereditary, or at least is evidently constitutional in some families. But where this is the case, we generally find a substituting evacuation in the more copious secretions from other organs. It is most common to persons of sedentary habits, such as students, professional men, shoemakers, tailors and artisans, and it is a frequent attendant on sea-faring individuals, so that though they may have a safe and prosperous voyage, yet they may have a "hard and troublesome *passage*." Conducive also to constipation or torpid bowels, is too great *refinement* in living, or the use of those articles of diet that contain a small amount of excrementitious matter, thereby not affording that stimulus to the bowels ordinarily required. It may also be produced by the free use of stimulating and astringent condiments and drinks, such as cinnamon, cloves and spices, and port and some other varieties of wines.

Another prolific source of evil, and indirectly, a cause of habitual constipation, is the frequent use of purgatives, which many nervous and hypochondriacal persons are in the habit of taking, without reference to the ultimate influence they must have on the bowels, and without a thought that any thing else but purgatives will answer their purpose. In fact, they seem to think it is only necessary to *use and take physic*. Habitual constipation, I am well convinced, is produced also by the free use of calomel and other preparations of mercury: in the treatment of fevers and other diseases, as well as the domestic use of that drug, so often taken to obviate costiveness—the very disease perhaps its use has created. By its overstimulating influence on the liver, an indirect torpor is produced, and as the secretion from that viscus is the only natural purgative of the bowels; when it is deficient, the bowels as a matter of course become *costive*. Constipation is also a very frequent attendant

upon pregnancy, being produced in part by the want of the accustomed exercise which usually attends that state and in part by the mechanical impediment which the gravid uterus upon the large bowels; to obviate which is sometimes a difficult matter, and not unfrequently one of great importance.

Treatment.—That form of constipation which is generally met with, requires no *active* treatment; the use of the means which I will soon recommend is all that will be necessary to remove the difficulty. But we occasionally find cases that require the employment of tolerably active measures to remove the accumulations which this state of the system has produced in the large intestines, and here and there we find a case in which the most active measures, and a resort to all the adjuvant means which experience can suggest, are necessary. When a full cathartic action is required, few remedies, and none, according to my experience, will be found so well calculated to fulfill this indication, as the compound powder of senna and jalap, with an equal quantity of cream of tartar. It has the advantage of being mild in its action, and quick and thorough in its operation. It will rarely disappoint the expectations of the physician in this respect. The two should be given in drachm doses, each in half a teacupful of cold sweetened water, and repeated in two or three hours if it does not operate. If however, the case should prove more obstinate than was expected, its operation should be assisted by an injection. This should be made of castor-oil, turpentine and molasses, or two drachms of the comp. powd. of senna and jalap may be mixed in half a pint of warm water, and thrown far up the bowel with a force-pump and tube. This course will rarely fail to afford the desired relief.

But now and then a very obstinate case occurs, in which such a degree of insensibility of the bowels exists that no ordinary measures will be sufficient to answer the purpose. I have, in a few cases of this kind, found a dose of two grains of podophyllin and four of leptandrin to produce most copious bilious evacuations, in about six or eight hours, without the aid of injections. If its action should not begin to be felt, either on the stomach or bowels, in about four hours, it should be repeated in slightly increased doses. The first effect of this medicine, in these large doses, is often a most copious emesis, which will rarely fail to be followed by a similar copious action of the bowels. This remedy will be indicated in any cases where the constipation is dependent on

torpor of the liver. But where the constipation is not peculiarly obstinate, the remedy should be commenced in much less doses, say half a grain of the podophyllin and one grain of leptandrin, and repeated every three hours till the cathartic influence is realized. In this way it rarely fails to bring away free bilious stools. It has another advantage, in that its action both on the liver and bowels is more permanent, and torpor of those organs is much less likely to follow its action, than that of almost any other remedy I have ever used.

With these various measures properly employed, I do not hesitate to promise success more prompt and certain than can be expected from any other means that I have seen tried. I very well remember an interesting case in a neighboring town, which I was invited to see. It was that of a young physician of respectability; nearly all the physicians of the town, some four or five, were in consultation, but had given up the case as beyond the reach of remedies. Upon examining the patient, I found a full and distended state of the bowels, to which a large blister had been applied. The stomach had become very irritable, so that medicine had recently failed to remain on it. After the examination, I found it to be the opinion of all the gentlemen present, that it was useless to attempt any further measures. My views being sought, they were surprised upon being told that I thought the patient ought not to die, and they desired to know how it could be prevented. I suggested the course which I should pursue, if the patient were mine, and that course was adopted. A soft bread and milk poultice was applied to the blistered surface, and dessert-spoonful doses of a decoction of the compound powder of rhubarb were administered every half hour, until the irritability of the stomach was relieved, and then followed by a full dose of the compound powder of senna and jalap. By the next morning, the physic had operated, the patient was relieved, and finally recovered.

In cases of habitual constipation, where there is no evidence of any great accumulations in the bowels, it is not necessary to resort to active cathartics. The indication then to be fulfilled, is to obviate the influences or remove the cause, producing the difficulty. The habits of patients should be attended to; they should be directed to take as much exercise in the open air as they can well endure. The directions I have heretofore given, when speaking of indigestion, equally apply to this form of disease.

But one of the most important points to be gained, is to induce

habits of regularity, either by the use of suitable diet, simple lavements, or the administration of such gentle tonics and aperients as will overcome the torpor of the bowels. When the case presents no general indication for the use of tonics more than is manifest from the mere atony of the digestive organs, the demands of the case will frequently be answered by an appropriate diet, and attention to the cause of the disorder. Rye mush and molasses may be mentioned as efficient in keeping the bowels open. Bread made of unbolted flour will sometimes answer a similar purpose. The free use of fruit, when the patient can bear it, frequently has the same effect. The old-fashioned rye and Indian bread, if used as the main article of diet of the bread kind, will rarely disappoint your expectations. It affords an amount of nutriment sufficient for the system, and will be as acceptable to the taste as any bread that can be used.

If the bowels can not be kept open and properly regulated by attention to diet alone, the patient should be directed to take a lavement of cold water, or if necessary, to begin with, molasses and warm water may be substituted, at a stated period every day, in order to induce a *habit* of regularity at stool. This will often answer quite as good a purpose as *physic*, and is much to be preferred, in most respects, if practicable.

The necessity for the habit of regularity in these cases, is of too much importance to be slightly passed over, since experience teaches that regularity of the bowels is often as much under the influence of habit, as the return of hunger or any other demand of the system. Patients should therefore be directed, at a particular and stated time every day, to solicit a call for an evacuation from the bowels, whether there is any inclination or not, and the aid of the lavements will rarely fail to answer the purpose.

But when constipation is connected with hepatic obstruction or general debility, these simple hygienic measures will scarcely be sufficient, and resort to medicine becomes most generally imperatively necessary. Such cases will usually be benefited by using in combination moderate tonics and cholagogue aperients. There is perhaps no one remedy more beneficial in such cases than the compound tincture of tamarac, or restorative bitters, with the addition of a small portion of podophyllum, administered in sufficient doses to produce one free evacuation a day. When thus prepared and given, you may expect in a short time to discover its action on the liver, by a change in the character of the evacuations, accom-

panied by general improvement. In those cases which will bear this stimulant, few if any other general remedies will be required. If there is a mere torpor of the bowels, without any particular inactivity of the liver, and especially if there are any objections to the use of the bitters, one or two antidyspeptic pills * may be given every night; this will generally procure one free evacuation every morning. Or the compound taraxacum pill may be used to fulfill this indication.

* R Ext. Gentian,
Tris-nitri Bismuth,
Pulv. Aloes, ss ʒij.,
Ext. Colocynth,
Gamboge,
Cast. Soap, ss ʒi.,
Oil Cloves, ʒss.

Mix, and form pills ordinary size. Dose 1 to 4.

LECTURE XXXIII.

LOCAL DISEASES—CONTINUED.

Introductory Remarks; Character; Symptoms; Cause; Predisposition; Anatomical Character; Diagnosis; Treatment.

CHOLERA MORBUS, OR SPORADIC CHOLERA.

In the consideration of this subject, I shall not include the epidemic variety of the disease, nor Cholera Infantum, as the former will follow what I propose to say on the subject of Cholera Morbus, and the latter falls within the province of one of my colleagues.

There are few diseases more common during the summer months than Cholera Morbus, or as it is called by some modern authors, Sporadic Cholera.

The leading characteristics of this disease are vomiting and purging; while the character of the evacuations depends upon the cause of the disease, and the attendant circumstances of the case. In most cases the contents of the stomach and bowels will be discharged, and in severe cases the dejections, following the ordinary accumulations, will present a thin, dirty yellow color, and from that to an almost colorless liquid, having a slight milky, or flour-gruel appearance; while in some very severe cases I have witnessed the peculiar rice-water evacuation, considered so characteristic of Asiatic cholera. But in less violent cases, after the contents proper of the bowels have been discharged, the dejections assume a more bilious appearance, and are not so copious, and are mixed with more or less slimy and albuminous matter.

In the more aggravated cases, little else is thrown from the stomach, after the first free emesis, than the fluids that are taken in, mixed with a glairy mucus. But in the less severe cases, the act of vomiting increases the biliary secretion, and changes the peristaltic movement of the duodenum, and the bile is thrown off. And in some cases, when overaction of the liver and an attendant accumulation of bile has taken place in the stomach,

bilious matter will be thrown up from the beginning. This is not however, in my experience, a common occurrence.

The vomiting and purging in most cases come on in paroxysms, occurring every ten or fifteen minutes; often simultaneous, but more commonly the vomiting takes place first, and immediately thereafter there is a call for the stool. For a few moments the evacuations seem to give relief, and the patient lies back in bed exhausted and comparatively easy. Thus the case progresses, with alternations of ease and paroxysms of vomiting and purging, until the patient becomes exhausted, the extremities become very cold, and there is generally an exudation of a cold, clammy perspiration from the surface and severe cramping of the muscles. Finally, rice-water discharges, with a general collapsed condition of the system occur, and the patient sinks into a comatose condition, and dies from exhaustion of the vital forces, in a state of universal congestion.

Or more commonly, the system rallies, the vomiting and purging become less frequent, the extremities become warm, and finally a reaction comes on, and the patient gradually recovers under a slight febrile excitement, which soon subsides and leaves him entirely relieved.

The vomiting and purging rarely commence suddenly, but are preceded by more or less uneasiness, sometimes with severe griping pains through the bowels; and generally a great commotion is felt, with a sensation of fermentation, together with slight nausea, for some time previous to the full development of the disease. Often a sensation of fullness and a burning feeling in the stomach precede an attack of cholera morbus.

When fully developed, few diseases are for the time being more distressing and severe; but in most cases it is a self-limited disease, subsiding spontaneously when the accumulations have been discharged. And even where the irritation is disposed to be persistent when left to itself, it will generally soon yield to appropriate remedies.

During the active symptoms of cholera morbus, it is very rare for the system to exhibit any general evidences of fever; though the patient is often tortured with an insatiable thirst, the pulse being small and the surface of the body cool, especially that of the extremities, which are often extremely cold. But after the vomiting and purging have ceased, whether from a spontaneous decline, or from the aid of medicine, a moderate degree of febrile reaction

usually occurs, and in some instances a high grade of fever supervenes, with a persistence and severity not common in such cases. In most instances, the fever is of but short duration, and leaves the patient only moderately debilitated, rapidly to recover. If irritating or drastic medicine has been administered during the active stage of the disease, or following its decline, the febrile reaction is more likely to be severe, and to continue for a much longer period, and may degenerate into a low grade of irritative fever, which, if improperly managed, may prove fatal.

However severe the attack, sporadic cholera, if properly treated, rarely proves fatal, and indeed without any treatment a large majority of cases will get well.

Causes.—During an extensive practice of many years' duration, in a section of country where cholera morbus may be considered as one of the most common diseases, I have no recollection of having ever met with a case of well-defined cholera morbus, in which I was not enabled to trace the immediate exciting cause of the attack, to some article either of diet or drink taken into the stomach. I do not intend to include in this remark, those cases of bilious vomiting that sometimes attend the early stage of bilious fever; nor those cases of masked intermittent fever which show themselves in the form of vomiting and purging at the regular periods for the paroxysm to return; nor those cases of irritation of the stomach produced by worms in children. I apply it simply to the ordinary cases of sporadic cholera so commonly seen during warm weather. There is no doubt however, that many circumstances greatly modify the organic functions, and thereby produce an unusual predisposition to cholera morbus. The occurrence of warm weather, with its relaxing influence on its first approach, tends to derange the functions of the system, so that upon slight exciting causes, the disease may be developed. This circumstance, in connection with the free use of green succulent vegetables as a diet, readily accounts for the frequent occurrence of cholera morbus during the early part of summer. It is also quite common during early autumn, when fruits and melons are plenty; as they abound in saccharine elements, and thus furnish the materials for fermentation, and most persons are apt to partake of them to excess. There is no doubt also, that the enervating influence of marsh malaria, occurring at this season of the year, affords an additional reason for the frequent occurrence of the disease. A sudden check of the perspiration, when only the ordinary food and drinks have been

taken, may be occasionally the only apparent cause of the disease; but in this case the stomach will be found to contain imperfectly digested food that had been previously taken. Unfermented cider often gives rise to the disease; and persons unaccustomed to the use of stimulating drinks, as wine or other spirits, are liable to be attacked after too freely indulging in them. In short, all substances furnishing the elements for fermentation, occasionally produce an attack in a person whose system is predisposed to the disease.

In connection with predisposing causes may be mentioned family or hereditary predisposition. This we often meet with, and it should always be borne in mind when giving directions concerning articles of diet in such families. In short, any circumstance productive of a tendency to irritation of the gastro-intestinal mucous surfaces, may be considered as predisposing to cholera morbus; while any substances taken into the stomach, in this condition, which are not readily digested, may act as exciting causes and develop the disease.

In the *anatomical* character of the disease there is but little of interest. The symptoms and history of the case point with great constancy to the existence of gastro-intestinal irritation; and it can scarcely be supposed that any other evidences of structural disease which might be discovered upon post-mortem examination, would bear any special relation to the disease, but should rather be considered as accidental. Opportunities are so rarely offered for investigation into the morbid phenomena of cholera morbus, that little can with any show of reason be said on the subject. The essential nature of the disease is without doubt an acute attack of gastro-intestinal irritation, produced by the direct irritating influence of various substances taken into the stomach already predisposed by the influence of season, thermometric changes, and other conditions of the atmosphere, or hereditary tendencies.

Diagnosis.—But little difficulty will be found in recognizing cholera morbus. The peculiar rice-water discharges and tendency to collapse, which are uniform attendants upon Asiatic cholera, together with its epidemic prevalence, will generally enable you to distinguish it from sporadic cholera. The existence of general febrile symptoms, and the general constitutional disturbance which precedes an attack of bilious fever, in which bilious vomiting and purging are present, will be sufficient to mark the distinction between bilious fever and cholera morbus or sporadic cholera.

The only disorders for which cholera morbus has much risk of being mistaken, are the effects of "certain mineral poisons." Says Professor Wood, "I have seen the operation of *calomel* in some instances so *exactly* like cholera morbus that the most experienced eye could have scarcely detected the difference. But in poisoning by *corrosive* substances, the vomiting generally precedes the purging by a considerable interval, the discharges are seldom so highly bilious, and the poison may often be detected in the evacuations."

Treatment.—From what has been said it is evident that the two main indications are, to remove the cause of the disease, and to allay the irritation that has been caused by it.

If the case is seen before the accumulations have been removed, and the patient is nauseated and imperfectly discharging the contents of the stomach, the natural efforts of the system should be aided in more freely ejecting the offending materials. In many cases, all that will be required to accomplish this object, will be to have the patient drink freely of some warm diluent fluids; even drinking plentifully of warm water will sometimes answer the purpose. But if this has been found, or should be thought insufficient, a full draught of a decoction of boneset will rarely fail to answer the purpose. This is to be preferred in all cases where it will answer, as ordinary emetics, however mild, must of necessity produce more or less irritation, and should not therefore be given unless indispensable. If an emetic proper is determined upon, one that will operate the quickest, and with the least irritation, should be preferred. There is probably no one of this class of remedies that is more speedy, and that can be relied upon as producing less local irritation than an infusion of lobelia and eupatorium. After the emetic is administered, or in case it is not thought necessary, a large sinapism should be immediately applied over the stomach and extending upon the bowels; while teaspoonful doses of an infusion of the compound powder of rhubarb (neutralizing powder) should be given every half hour; and the patient must be enjoined to remain very quiet; and to resist as much as possible the inclination to vomit. In the meantime the patient should not be allowed to take more than one or two teaspoonfuls at a time, of any fluid into the stomach; this may be of ice-water, if it is at hand and suits the stomach, or of a weak infusion of spearmint, from which I have often seen very good effects. The neutralizing medicine should be continued in the small doses before directed every half hour, until

vomiting is checked, which allow me to remark will seldom be long delayed, for I have rarely seen a patient reject the second dose.

It is true that cases will occasionally be met with, in which, after the stomach is relieved of its burthen, so much sensitiveness and irritability will remain, that the very thought of medicine is repulsive, and its appearance will make the patient gag. In these cases I have found very small doses of morphia to answer an excellent purpose in quieting the nausea and arresting the excessive irritability of the stomach, and also in restraining the bowels. It should be given however, merely as a local sedative, and not with a view to its general influence. From one-twentieth to one-sixteenth of a grain may be given and repeated every half-hour for three or four times.

The morphia will be more likely to be beneficial in those cases connected with bilious vomiting, as then the action of the opiate in arresting the secretion of bile is an important indication. In many cases, where the constant regurgitation of bile into the stomach keeps up such an irritable condition of that organ as to render it difficult to retain medicine long enough to have any effect. I have seen most prompt and satisfactory results from administering teaspoonful doses of strong, clear coffee, repeated every few minutes.

I can not however, refrain from impressing upon your minds, the confidence that a long experience justifies me in reposing in the effect of the sinapism to the stomach, and the small doses as directed of the neutralizing powder, in allaying the irritation of the stomach; seldom having to resort to any other measures for that purpose, except in those cases where it is necessary first to administer an emetic.

When diarrhea continues after the irritation of the stomach has been relieved, the neutralizing medicine should be continued, but in much larger doses, until its effect is seen in the evacuations, when it should be suspended. For this purpose it may be given to an adult in the dose of from half a fluid ounce to a fluid ounce, and repeated every two hours.

During the active symptoms of cholera morbus, nothing should be taken into the stomach excepting what is absolutely necessary, and of that but little at a time. And even after the disease is relieved, the patient should be directed to use a very simple and mainly farinaceous diet for a number of days, lest the irritation be prolonged and the case degenerate into chronic disease.

If however, the diarrhea should persist after the measures already suggested have been tried, without much evidence of local irritation, you will find the tinc. catechu and paregoric in equal parts, administered in teaspoonful doses after each evacuation, to answer an excellent purpose.

But if the disease has produced a high grade of irritation, which shows an unwillingness to subside, after the urgent symptoms have been measurably relieved, the mustard poultice should be followed by the hot hop fomentations, and the patient directed to take small quantities of marsh mallow mucilage, and not to take any thing else into the stomach, and the bowels should be restrained by the occasional administration of a starch and laudanum injection.

Or if the irritation should not seem inclined to subside under the influences of the appliances already suggested, a number of cups should be applied to the epigastrium, and they may be followed by the fomentations. Or the croton-oil may be rubbed over the stomach, which, when thus applied after cupping, will rarely fail to produce a full crop of fine pustules. The irritation referred to will be indicated by the redness of the tongue and great tenderness of the epigastrium.

Those cases of periodical cholera morbus, to which reference has been made, I have fully considered when speaking of the modifications of intermittent fever and masked ague. They should be treated in every respect like the common form of cholera morbus till the intermission occurs, when without reference to the previous symptoms, the antiperiodics should be given in liberal doses, with a view of preventing another paroxysm.

LECTURE XXXIV.

LOCAL DISEASES—CONTINUED.

Epidemic Cholera: Introductory Remarks; History; Progress; Appearance in United States; Symptoms of different Stages—First, Cholerine Stage—Second, Positive Invasion—Third, Collapse—Fourth, Reaction and Convalescence; Variations; Anomalies; Blood in Cholera; Rice-water Discharges; Anatomical Character; Causes; Predisposing; Exciting.

EPIDEMIC CHOLERA, ASIATIC CHOLERA, ETC.

The great fatality by which this terrible scourge of the human family has hitherto been characterized, demands at the hands of the medical profession, a thorough investigation of the etiology and nature of the disease, and of the comparative results of the various methods of treatment, which have been employed in different places and under different circumstances. Indeed we might better say, that where the profession have been so uniformly unsuccessful in treatment, where they have been so signally baffled in every effort they have made to arrest a disease or even to mitigate its violence, as they have in regard to this epidemic, there is no room for any sentiment except profound humility in view of the past, and an ardent desire to receive suggestions and duly weigh propositions from every quarter, with a hope of being prepared more successfully to cope with this fell destroyer, when next it shall appear in our midst. Though my experience in the treatment of this disease has not been as extensive as I could have desired, previous to being called upon to discuss its character and proper management, and though my field of observation has been more limited than those of many others, yet I have made some observations and am prepared to make a few suggestions, which with some deference, I shall present to you before dismissing the subject. My views will not of course have as much weight, as if they were the result of long and extensive experience, yet I bespeak for them a candid and deliberate investigation, and if not consistent

with ascertained facts, nor sustained by future observations, let them share the appropriate fate of errors.

My principal reliance however, in the consideration of cholera will be upon information derived from the reports of others who have had experience in its treatment. And while none can boast success in this respect, sufficient to justify a claim to exclusive orthodoxy, there will certainly be found a wide difference between the results of different modes of practice. These are before us and constitute a common stock, upon which all may draw, and although the most successful system may not gain our exclusive confidence, yet the least successful will not be devoid of interest and instruction. The statistics of the latter may serve as admonitory warning; while the suggestions of the former may afford us starting points, from which we may now set out to make further progress, in preparing to grapple with this pestilence. The little that is known of practical value in regard to this formidable malady, justifies the opinion that much remains yet to be discovered.

It will be proper to commence the consideration of epidemic cholera with a brief glance at its history. Although unknown in this country until 1832, it existed in Asia at least as early as 1774, and probably earlier. It prevailed there at different times and places until 1817, when it broke out with terrible severity in Bengal, and committed great devastation in the British army, stationed in the North-eastern district of India. From Bengal it spread in various directions, so that by successive epidemics, during the years 1818, 1819, and 1820, it appeared in all parts of the peninsula of Hindostan, traversed the Chinese Empire, Korea, and the peninsula of Malacca, in the South-east, and extended to British and Chinese Tartary, in the North-west. From the eastern coast it also visited Ceylon, Sumatra, Borneo, the Philippine Islands, and even the distant islands, Mauritius, and Bourbon.

Its progress to the North-west, toward the peninsula of India, was not at first as rapid, nor as sudden as a storm from the sea. It does not indeed appear to have passed the Indian subcontinent, which year it made its appearance in Persia and on the eastern shore of the Persian gulf. According to the history of the disease it was stayed by the approach of winter, and in the spring of 1821 broke out on the eastern coast of the Persian Gulf, and spread to Syria from Mesopotamia. It did not return to Persia until the summer, when it broke out in Amree. It again appeared in the winter, and reappeared in the spring of 1822, continuing in the

course of the summer the Syrian towns on the Mediterranean coast. In this year also, having traversed the Persian empire, it broke out at Astrachan, a Russian city at the mouth of the Volga, and at other places on the shore of the Caspian sea.

Having now reached the North-western border of Asia, it made no further progress in this direction until 1828, when it appeared at Orenburg, on the confines of Russia in Europe; but it still seemed to hesitate, oscillating as it were, until 1830, when it entered Europe, appeared on the shores of the Black sea, penetrated the center of Russia, and guided by the channels of the Volga, the Don, and their tributaries, reached Moscow—where it prevailed during the winter, and in 1831 attacked St. Petersburg. During the last mentioned year, it extended also to Poland, Prussia, the German States, and Hamburg, on the western coast of Europe; crossed the North sea; appeared, in October, at Sunderland, on the North-eastern coast of England, and at Edinburg in Scotland, in January, 1832. Rapidly as the epidemic had extended during the previous year, its progress was still more rapid in 1832. In this year, it broke out in London and many other places in England, extended to France and Spain, crossed the Atlantic, and appeared in June, first at Quebec, then at Montreal; and pursuing the course of the St. Lawrence and the Lakes, reached the valley of the Mississippi.

But the mouth of the St. Lawrence was not the only avenue through which this invading foe gained access to our country. It appeared at New York almost simultaneously with its attack on the Canadian cities. From New York it passed up the Hudson to Albany, and southwardly to the waters of the Delaware and Chesapeake, reaching Philadelphia on the 5th of July, and Baltimore within the same month. It appeared on an island off Charleston, South Carolina, in November; in February, 1833, broke out at Havana, in Cuba, and before the close of this year, had extended to Mexico.

Thus within the first year after its access to our shores, this epidemic spread over the greatest portion of North America. It subsided, especially in the Northern States, during the winter, but repeated its ravages during the spring and summer of 1833, and again to some extent in 1834. It did not in its first visitation to our country, molest the settlements on our Pacific sea-board, but having reached the borders of the unbroken wilderness and almost untrodden plains, this messenger of terror seemed to regard its

mission as closed for a time. And now like some monstrous bird of prey, satiated temporarily with the ravages of three summers, it spread its pinions, and soaring above the snow-clad summits of the Rocky mountains, and casting a contemptuous glance at the sparse population of Oregon and California, took its flight across the broad Pacific, and settled down upon its native soil.

During the rapid extension of the epidemic in a western direction, its influence was propagated also to the north and south of what might have been regarded the main track of its progress, but not so rapidly in Europe as in America. Thus, the disease reached New Orleans a year before it appeared in Sweden and four years before it prevailed in Sicily. It did however, overrun Arabia and Egypt in 1831, as if by a detachment marching due west from the Persian gulf. But the chief line of its progress, after leaving Asia, was through the centres of Asia and North America, and in this line it traveled as we have seen, with variable speed, but upon the whole with remarkable rapidity, for from the time of its appearance in Russia, in 1830, it required but two years to reach the Mississippi valley, notwithstanding the interruptions of winter, which always retarded its progress and generally arrested it. It did not attack all the towns and cities which lay in its course, but seemed to exercise a very capricious discrimination in selecting its points of attack. Generally it is true, it seemed to prefer low, filthy, and densely populated districts, but sometimes places of this character were passed by, while the inhabitants of the most elevated, clean, and isolated dwellings were chosen as its victims; facts which completely subverted every hypothesis, and baffled all conjecture as to the circumstances calculated to induce an invasion of the malady.

The intensity of the morbid influence was by no means uniform. Where the disease prevailed in a district, one or more points were generally selected in which the epidemic force appeared to be especially concentrated, while the inhabitants of the adjacent territory suffered from irregular, predatory visitations, as if from scouting parties detached from the main body.

The epidemic usually appeared the second and sometimes the third summer in places where it broke out during the first season of its prevalence; but in some instances towns which escaped at first and which began to be regarded as exempt from the disease; were attacked during the second or third year.

Such is a brief historical sketch of the first visitation of Asiatic

cholera to Europe and America. Having in this manner encircled the entire globe, and ravaged almost every important district inhabited by man, it confined its operations for a while to the East Indies, where it has appeared to be endemic, scarcely failing to prevail to some extent every year since 1817. In 1847, however, having as we may suppose, recruited its exhausted forces by a truce of thirteen years—for I can scarcely divest it of the militant character—it again took up the line of march intent on foreign conquests; but not finding much new territory worth invading, it chose to pursue its former course, and triumph again on the field of its former victories.

Its progress in this *second incursion* has not varied essentially from that of the first, and although its violence has generally been less severe, its type and habits have been about the same. As it has advanced westward, it has as before generally subsided in the east; so that in its progress it may be compared to a terrific storm, its approach foreshadowed by omens of calamity, its prevalence overspreading the land with gloom and devastation, and its departure, in sullen grandeur, leaving to the mourning inhabitants the melancholy assurance, that others are now suffering what they have just endured.

Thus have Europe and America been visited a second time by this dreadful scourge. This country indeed has not yet been relieved entirely from the second invasion. During the last two summers, (1849 and 1850) it has reeled in nearly all our towns and cities, and in many rural districts, and has at last attacked the inhabitants of the Pacific coast. It is highly probable that during the approaching summer, its ravages will be to some extent repeated among us; at least it behooves us all to be as far as possible prepared for it.

From this brief sketch of its history, we may derive the following facts in regard to the *habits* of malignant cholera. *First*: that it is endemic in India, but occasionally becomes epidemic, radiating, so to speak, from that central point in every direction to greater or less distances. *Secondly*: that occasionally its tendency is more especially in a western course; and that when this is the case, its progress, though fitful and vacillating at times, is generally marked by increasing rapidity. *Thirdly*: that natural obstacles, such as deserts, mountains, and oceans, though they may temporarily check, can interpose no impassable barrier to its progress. *Fourthly*: that winter usually causes it to subside, except where the weather is

mild, or where a kind of artificial summer is sustained, as in the cellar-like habitations of the peasantry in Russia. *Fifthly*: that though it appears to prefer natural channels, such as the courses of rivers, or other public thoroughfares, in its advances; and though it usually selects low, filthy, and crowded localities as points of attack, yet in neither of these respects does it observe any uniform rule. *Finally*: that its prevalence in any place seems to be dependent on the presence of some unseen influence not usually existing there, and capable, according to some law by which it is governed, of more intense concentration in particular localities than in others, in the immediate vicinity.

Let us now pass to the consideration of the *symptoms of epidemic cholera*, or in other words, to an inquiry into its private history and character. For the purpose of a more clear description, I shall regard the disease as embracing three stages, and shall therefore present this branch of the subject under the following head:

1. First, or premonitory stage,
2. Second, or active stage,
3. Third stage, or collapse,
4. Reaction and convalescence.

1. *First, or premonitory stage.* What are usually called the "premonitory symptoms" of Asiatic cholera, have reference, first, to the whole community, and secondly, to single individuals. When the epidemic influence of this disease exists in any district with sufficient intensity to render an outbreak of the pestilence probable, that influence will be felt by most of the inhabitants. This is evinced by the general prevalence of unnatural sensibility of the stomach and bowels, constituting a predisposition to disorder in those organs. Very slight causes; so slight indeed sometimes as to be unobservable, are sufficient to produce gastric disturbance, moderate diarrhea, or it may be, slight dysentery. As the morbid influence becomes more intense, cases of active and protracted diarrhea become more frequent, and exhibit a more or less decided resemblance to the active symptoms of cholera. The French writers, and some others, have applied the term *cholerine* to cases of this kind, to indicate an attack approximating, but not amounting to cholera. Symptoms of this kind may exist in a community for a longer or shorter period, and then gradually disappear without the development of a single case of malignant cholera. In this case the symptoms I have described, although indicating a

strong predisposition to the disease, can not with strict propriety be said to constitute a *stage of cholera*. Such a state of things may be regarded as a general *premonition* that the community where it prevails is threatened with a visitation of the malignant malady.

But where an individual, situated in or near a locality where cholera actually prevails, experiences the intestinal disturbance, he will seldom fail of having the disease, unless promptly relieved. Hence under such circumstances, an attack of diarrhea or "cholérine," even though but slight, should be regarded as the premonitory, incipient, or first stage of cholera.

The *premonitory stage* varies much in different cases both in the character and duration of the symptoms. These may be stated in general terms to be: gastric derangement, evinced by irregular appetite, fur on the tongue, and sometimes pain or fullness in the head and slight vertigo, and in some instances nausea and vomiting; intestinal disorder, attended with diarrhea, slight colic pains perhaps, the discharges becoming light-colored and thin, if not so at first, and each evacuation attended with a sensation of great debility; nervous disorder, evinced by the cerebral symptoms already mentioned, and often by neuralgic pains and spasmodic twitchings of the muscles. In some cases there are slight febrile symptoms, but generally there is a great tendency to relaxation of the skin and perspiration. The urine and other glandular secretions are very scanty, and become more and more so; the alvine discharges may have been bilious at first, but soon lose that character, and assume a turbid, dirty-white appearance.

Such are the symptoms of a well-marked premonitory stage. Very often many of these symptoms are wanting, a slight diarrhea, with some uneasiness in the stomach and a feeling of languor, may be the only departures from ordinary health, previous to the commencement of the malignant disease. This stage may continue for a longer or shorter period, from an hour or two to several days; or it may be wanting altogether, and the active symptoms of cholera take the individual by surprise.

2. *Second, or active stage.* When the case commences with the symptoms above described, they may gradually increase in activity and develop the malignant disease, without any definite point to distinguish the commencement of the second stage. Generally however, these premonitory symptoms are suddenly changed into those of a more active and alarming character; and sometimes,

as was before stated, the full force of the disease is suddenly experienced.

Almost all reports which have fallen under my notice concur in stating that, in a majority of cases, the active symptoms of an attack of cholera, or those which I shall describe as commencing the second stage, show themselves first between sunset and sunrise; and, according to my own observation they oftener occur after than before midnight. The active symptoms usually commence with copious watery discharges from the bowels. Vomiting often sets in immediately, or soon follows, and cramping of the muscles is usually an early symptom. The vomiting and purging, when both symptoms have commenced, are apt to be simultaneous, very frequent, and attended with a sense of great oppression in the epigastrium, and of weakness and sinking away in the abdomen, and sometimes with severe spasmodic pains in the bowels. Where diarrhea has not previously existed, the matter first discharged from the bowels usually consists of ordinary fecal substance. It may not be even thin, nor deficient in bile, but very soon the dejections assume the character of a turbid, light-colored fluid, resembling "rice-water" in its appearance, and either odorless or having a faint, sickish smell. The quantity of this fluid is frequently enormous, and the calls for its discharge almost unceasing, though usually each evacuation is followed by a brief space of comparative relief. The vomiting at first, discharges the ordinary contents of the stomach, in many cases revealing the imprudence in diet which may have excited the attack; but afterward the ejections consist of matter entirely similar to the anal discharges. Very little straining usually attends the evacuations either from the stomach or bowels, yet they are expelled with force, as if by spasmodic effort of the viscera themselves. The cramps usually commence in the muscles of the extremities, but soon extend to those of the abdomen and chest. The suffering produced by this symptom, in most cases, beggars description. The muscles, by the spasmodic contraction of their fibers, are drawn into hard knots with excruciating pain; this after a minute or two is followed by momentary relaxation, and then repeated; or different muscles may be attacked in succession, drawing the body and limbs into various distortions and allowing the unfortunate sufferer not a moment's respite.

The pulse may be but little affected at first, but it rapidly sinks as the above symptoms continue, becoming frequent, feeble, fluttering, and finally perhaps imperceptible. The tongue is not usually

much coated, but pale and moist; though there is great thirst and a sense of internal heat. The surface is covered with a copious perspiration, which increases as the case progresses; the skin begins early to assume a dusky hue, which finally deepens into a bluish, leaden or violet color, especially on the face and extremities; it loses its elasticity and becomes shriveled and sodden; so that when pinched into a fold it does not readily return to its natural position. The surface soon becomes cold, and there is an evident stagnation of the blood in the capillaries. The urinary and other glandular secretions are suppressed. The patient is exceedingly restless, complains of insupportable distress in the præcordia, and difficulty of obtaining a satisfactory inhalation of air. These symptoms may be more or less severe from the beginning, and their progress may vary in rapidity, but if not arrested they usually increase in severity, and within from two to twelve hours reduce the patient to a condition of extreme prostration, or what I shall designate as the third stage.

3. *Third, or cold stage—or stage of collapse.*—The pulse is now nearly or quite imperceptible at the wrist, and but a slight palpitation of the heart can be recognized. If a vein is opened no blood will flow, or at most an ounce or two of tar-like blood can be squeezed from the orifice, which forms a very loose coagulum on standing. The features are livid and shrunk away, the eyes have settled back in their orbits, the conjunctivæ are dry, injected and glaring, and the whole countenance is often so much changed as scarcely to be recognized by intimate friends. The entire skin presents a dark leaden, or violet color, the hands and feet are shriveled, and have a sodden, doughy feel; the whole surface is cold and covered with a clammy sweat; the voice is lost or very feeble; the breath scarcely warmer than the atmosphere, the respiration hurried and feeble, or else slow and sighing or almost imperceptible. The evacuations cease entirely in some cases, but if continued they pass involuntarily, and if there are still discharges from the mouth they come up in passive eructations, sometimes followed by hiccough. The cramps also sometimes subside, but more frequently continue to the last, or they return just before death; and it is by no means uncommon to see the muscles in a state of firm contraction long after life is extinct.

There is usually some stupor toward the last. This may indeed be an earlier symptom, but in most cases the patient is capable of being aroused, and then he exhibits his usual intelligence and

memory. Sometimes the mental powers continue unobscured until about the period of decease, and after the capacity for emotion seems to be exhausted. The patient lies perfectly helpless, and though fully conscious of his condition, often manifests remarkable indifference to his family and friends, or even to his own fate.

In many cases, the patient having fallen into this stage of collapse, rapidly sinks into the arms of death. Sometimes however, this stage will be prolonged by feeble efforts of the system to rally its energies into a reaction. The pulse may partially revive, and a slight warmth return to the surface, but these flattering symptoms generally subside very soon, and the patient again succumbs to the overwhelming influence of the disease. The clammy sweat breaks out afresh, the cramps again seize the muscles, the surface becomes cold, though the patient experiences a sense of excessive heat and thirst, dyspnea comes on, a few gasping efforts at respiration are made and the patient expires.

The duration of this stage is variable of course. Suffice it to say, that death sometimes occurs within three or four hours after the commencement of the active symptoms, or second stage, oftener at the end of eight and ten hours, and more frequently still after the lapse of a day or two.

4. *Reaction and convalescence.*—A small portion of cases, in which patients sink fully into the collapsed condition, recover, or even exhibit symptoms any thing like vigorous reaction. But where this is the case at any stage of the disease, there is a cessation of the discharges, and a return of heat to the surface; the color of the skin becomes more natural, the pulse is diminished in frequency but increased in force, the uneasiness and oppression gradually subside, and the patient falls into a quiet sleep. The secretions of the liver, the kidneys and other glands are restored, the patient on awaking is perhaps able to relish some very simple nourishment, and the reaction may now be regarded as established. In a majority of cases in which reaction occurs at all, it takes place before the occurrence of the third stage, or collapse, and the efforts of the practitioner should always aim at producing it as early in the case as possible.

Reaction having been produced, the probabilities of recovery are of course very much increased. Still the case is by no means divested of danger. There are two ways, especially, in which the patient may yet be destroyed: first, he may from some slight imprudence in eating, exercise, or exposure, experience a relapse

in the active symptoms of cholera, sink quickly into collapse and die. Such a result is by no means uncommon, and the utmost circumspection should be enjoined in all these respects. Or secondly, where the case has been rather severe and the patient much reduced, a secondary fever may set in, characterized by low typhus symptoms, a hectic flush on the cheek, the eyes are suffused, the tongue is dry and red; the patient sinks into a drowsy stupor; sometimes there is subsultus tendinum and low muttering delirium; papillæ appear upon the face and body. Under these symptoms the patient sometimes sinks into a state of coma, and dies in a few hours; he may survive a week or more, and then sink, or possibly recover after a tedious confinement. Recoveries under such circumstances however, are exceptions to the general rule, especially where the original attack has been very severe and the stage of collapse protracted.

Convalescence from cholera is often uninterrupted by symptoms of general or local disease, and very rapid; the patient regaining his accustomed appetite and vigor in a few days. This is however, more likely to be the case where the disease is arrested early, at least before the commencement of the cold, or collapsed stage. In most cases however, where the system has been severely handled by the disease, the patient is left in a condition of debility. He will complain of great weakness, of uneasiness and tenderness in the epigastrium and abdomen, of irregular appetite and indigestion. His tongue will be dry and red, if not furred, the bowels irregular, the skin dry, in short, the case will present all the symptoms of gastro-intestinal irritation, from which even under appropriate treatment, the patient may require weeks, and even months, to fully recover.

Variations from the ordinary course and symptoms of epidemic cholera frequently occur, and occasionally cases are encountered which appear to deserve the epithet of anomalous. Among the more frequent variations of symptoms may be mentioned the absence of vomiting altogether, and perhaps of nausea, until a very late period in the case. Less frequently, yet occasionally, we meet with a case in which there is no diarrhea, perhaps entire inactivity of the bowels, though in every other particular the character of cholera is clearly marked, and the patient sinks into the cold stage and dies. The cramps are in some cases very mild, and in few cases entirely wanting. But the *anomalous* cases to which I referred, are remarkable for the absence of all, or nearly all, the active

symptoms of cholera. The patient is suddenly attacked with symptoms of congestion of the brain, or *coup de soleil*—perhaps accompanied with obstinate convulsions. In these cases, occurring during the prevalence of cholera, and exhibiting the passive symptoms of this disease, the relaxation of the tissues, the congestion of the capillaries, the cold perspiration, the asphyxia, and after death the presence, in some instances, of the light-colored fluid in the intestines, which would, in ordinary cases, have been discharged by diarrhea and vomiting—in cases of this kind, I say, we must suppose that the morbid cause has been sufficient to overwhelm the nervous system at once, so that the organs are incapable of the ordinary efforts to relieve the system. In other cases a similar train of phenomena are presented, except that there is little or no cerebral oppression, nor convulsions; the patient yielding passively to a debilitating influence, which evidently spends its force upon the nerves of organic life, and he seems, as it were to sweat to death, without either vomiting or purging.

It may be well to notice in the next place the *character of the blood* in cholera patients. The lancet is in such great favor with a portion of the medical profession, that you need not be surprised to read of its employment in any form of disease; and in cholera it has, by some practitioners, been made a prominent means of treatment. Although the abstraction of blood from the vessels can never have benefited the patient, yet it has subserved a valuable purpose in exhibiting the character of that fluid during the progress of the disease.

The *blood* obtained from patients in the stage of *collapse* is thick, viscid and very dark-colored, even when drawn from an artery. Indeed this is precisely the condition one would be led to anticipate from an observation of the prominent symptoms. The drain upon the system, by the copious discharges from the mucous surface of the intestines and from the skin, could not fail to greatly inspissate the blood; while the manifest inefficiency of the respiratory function must of course leave the fluid unaërated and consequently black. It forms a very loose and brittle coagulum in standing, and the serum which is separated from the crassamentum is in very small proportion and has a greater specific gravity and darker color than that of healthy blood. *Chemical analysis* discovers in the blood a great deficiency of water, a diminution in the proportion of fibrin, and of saline matter, and consequently an excessive proportion of red globules. In cases somewhat

protracted, in which the secretion of urine was suppressed for some days, urea in appreciable amount has been detected in the blood.

The "rice-water" *evacuations* of cholera, have a decidedly alkaline reaction, and consist principally of the very elements found to be deficient in the blood. According to the analysis of Dr. O'Shaughnessy and others, the liquid portion of this fluid is composed of water, carbonate of soda, and the other saline ingredients deficient in the blood, while the solid portion is made up of albumen, cassein, and fragments of mucous epithelium, derived from the intestines; and the fluid is totally deficient in the peculiar principles of bile. In some cases where the diarrhea and vomiting continue to a late period of the disease, the color of these discharges will become brown or even black, owing evidently to the escape of the coloring matter with the serum of the blood.

The *anatomical characters* of cholera depend, in a great degree, upon the duration of the case, and the stage in which the disease proves fatal. Where the course of the symptoms was very rapid and the patient died in the collapse, very little, if any morbid alterations will be found in any of the structures. The external appearance of the corpse will be strikingly peculiar; more changed perhaps from that of life, than are usually the victims of the most tedious forms of disease. The same leaden hue and shrunk, shriveled appearance which characterizes the stage of collapse, is presented with little alteration after death. It is also a remarkable fact that subjects who have died in this stage, will not only be frequently found with firm contractions of the muscles, as was before stated, but with palpable increase in the warmth of the surface, which will continue perhaps for one, two or more hours.

The appearances on dissection, following an ordinary case of cholera which has proved fatal in the cold stage, may be briefly stated. The veins are engorged with viscid, black, partially coagulated blood, while the arteries are empty, with the exception, it may be, of occasional clots in the aorta and left ventricle. Venous congestion is found in all parts of the system, as the brain and spinal cord, the glands, the mucous membranes, serous membranes, and even the spongy structure of the bones. The lungs however, often appear to have escaped congestion, and the spleen is sometimes smaller and drier than in health. In consequence of this venous congestion, the small intestines are violet-colored, or have a florid appearance on opening the abdomen; and the mucous membrane, throughout the alimentary track, is reddened and

somewhat thickened. The peritoneum is dry and glossy, or else covered by a thin layer of viscid matter, causing opposing surfaces of the membrane to stick together, and the same is true of the pleura and other serous membranes. The cellular structure of the intestinal wall is sometimes slightly infiltrated with serum. The glands of Brunner and of Peyer are enlarged, and not unfrequently a vesicular eruption is observed through the extent of the small intestines, consisting of minute elevations of the transparent mucous epithelium, filled with a serous fluid, which escapes when the vesicle is punctured. The entire canal is usually distended with a light-colored fluid identical with that of the characteristic evacuations, though its color is sometimes changed to dark red or brown, by an effusion of the coloring matter of the blood, and the evacuations sometimes present the same appearance before death. The mucous surface of the stomach and bowels is often more or less covered by a coat formed evidently by deposit of the flocculent substance which exists in the "rice-water" evacuations; and in the stomach a glairy mucus is sometimes found adhering, in some degree, to the surface. Little change in the texture of the mucous membrane can be detected. The liver and kidneys afford no evidence of disease, further than by participating in the universal venous congestion. The gall-bladder is usually filled with bile, somewhat thickened, but not unhealthy. The bladder is empty and contracted down to the walls of the pelvis, and its mucous surface, together with that of the ureters and kidneys, often presents a layer of substance similar to that described as lining the bowels.

Where death results from fever or inflammation following an attack of cholera, the post-mortem appearances are very different, and correspond with the location, extent and duration of the secondary lesion. There is in this case less general venous congestion, the blood is not generally so dark nor so nearly decomposed. The contents of the bowels are darker colored, containing bile and sometimes blood. The mucous membrane of the stomach and bowels is red, thickened and softened to a greater or less extent, presenting positive signs of inflammation, or at least a high grade of irritation. If the case has been protracted, ulceration of the mucous membrane will probably be observed. Inflammation of the liver, lungs, brain and spinal column are not unfrequent. Perhaps the most common evidences of serious local lesion are found

in the brain and its meninges, and in the nervous ganglia and their investing membranes.

We come now to inquire into the cause of epidemic cholera. Various hypotheses have been suggested, some of them ingenious, others absurd, and all lacking that degree of evidence necessary to establish a claim to entire confidence. All must however, agree that the specific cause of cholera is some invisible influence, which either does not ordinarily exist, or is only occasionally operative. A great effort has for instance been made to prove that the impregnation of the water with lime is the cause of cholera. The argument is based upon the fact that countries where the limestone formation occupies the surface, and where the water used by the inhabitants is more or less impregnated with that earth, have been more generally overrun by this pestilence, than those where primitive and sandstone formations, and consequently soft-water prevailed. But although the local influence may, and probably is a predisposing cause to the prevalence of cholera, yet some other influence must be assumed to account for its recurrence. Why has it not always prevailed in limestone districts? And why, since its appearance, does it not continue among us, as our wells and streams are still impregnated with lime? and again, how does it happen that it does not entirely avoid those places where the water is soft, and limestone unknown, as is the case at Bangor, Maine, and other places which might be named, where cholera has occurred with great fatality?

What then is the subtle, intangible, invisible, and yet remarkable influential principle which constitutes the specific cause of cholera; a cause which, although its efficiency is often promoted by circumstances which predispose to or excite morbid action in the system, yet is capable, when concentrated, of producing cholera, without the aid of any apparent predisposing or exciting causes? After examining all the hypotheses which have fallen under my observation, such as those referring it to the influence of the planets, to the approach of comets, to meteoric changes or peculiar electric states of the atmosphere, to malaria, to atmospheric fungi, and to invisible animalculæ existing in the air—my mind is more strongly impressed with the last mentioned proposition than any other. The habits of the epidemic, its capricious movements, its apparent obedience to whimsical impulses, similar to those which govern the movements of swarms of visible insects or of flocks of birds,

concentrating in masses in certain localities, while small detachments of erratic stragglers may be seen flying about at different distances from the main body, seem to favor this hypothesis. The objections to this theory, as mentioned by Prof. Wood, are "its utter want of proof," and the "fact that the cause of cholera, whatever it may be, withstood the severity of the winter at Moscow." I acknowledge there is the absence of demonstrative proof to sustain this hypothesis, and the same is true of every other theory of the cause of cholera; and I do not profess to adopt it as unquestionably true, but am constrained to favor it, as being sustained by more probabilities than any other doctrine. The fact that the disease prevailed at Moscow during a Russian winter, has some force as an objection, but when we observe that the general tendency of cholera is to subside on the appearance of very cold weather, and that in the cell-like huts of the Russian peasantry, to which the disease appears to have been principally confined at that time, a high degree of temperature is constantly maintained during cold weather, the objection is well-nigh removed. It may be further suggested that we are all familiar with the fact that many visible insects exist in a dormant state during winter, and make their appearance during intervals of mild weather, and in dwellings which are kept warm.

But as it has been already suggested, there are *predisposing* and *exciting* causes which favor the development of cholera, and doubtless serve in many cases to increase the violence of the symptoms. Whatever has a tendency to impair the general health, or to diminish the vital forces, may be regarded as a predisposing cause. Previous disease, old age, irregular, intemperate and vicious habits, deficiency of food, confinement to vegetable diet, exposure to confined, damp and otherwise vitiated air, as where many persons are crowded together in prisons, ships, camps, etc., protracted depression of spirits from grief, fear or other emotions, any and all of these, with many other circumstances calculated to reduce the constitutional stamina, may be regarded as predisposing causes of cholera. It may also be proper to remark here, that not only are persons in debilitated conditions, or with shattered constitutions, more liable to take the disease, but they are less likely to recover from its attack.

The *exciting causes* of cholera do not materially vary in character from those named as predisposing, except that their impression is more suddenly produced. Any circumstance or occurrence, calcu-

lated to derange suddenly the organic functions, may excite an attack of cholera in persons laboring under the specific cause. Hence the sudden exposure of the person when warm to cold, or dampness, by checking perspiration and destroying the equilibrium of the circulation, is a frequent exciting cause. Unwholesome food or drinks, such as unripe fruit or indigestible vegetables, impure water, fermenting liquors, as cider, etc., or overloading the stomach with even wholesome food ; the use of very cold drinks, as ice-water ; purgative or irritating medicines ; immoderate exercise ; sudden mental emotion and many other things may be named under this head.

LECTURE XXXV.

LOCAL DISEASES—CONTINUED.

Nature of Cholera ; Primary Seat ; Prognosis ; Treatment of different Stages : Treatment of First Stage ; Treatment of Second Stage ; Treatment of Third Stage ; Dr. Morrow's Treatment ; Dr. Jordan's Report ; Concluding Remarks.

EPIDEMIC CHOLERA—CONTINUED.

It will not be necessary to spend much time in discussing the *nature* and *diagnosis* of Asiatic cholera. That it is not essentially an inflammation of the mucous membrane of the alimentary canal, as has been urged by some, is to my mind evident from two or three considerations. *First*; where the disease is arrested before the collapse, there are no symptoms of inflammation presented in many cases, but patients recover with great rapidity. *Secondly*; when the patient dies during the stage of collapse, the post-mortem appearances are not such as usually follow inflammatory action. The congestion of the gastro-intestinal mucous membrane does not materially differ from that of all other structures in the body, and there are no more symptoms of inflammation in the alimentary canal than are found in the kidneys, bladder and skin. *Thirdly*; inflammation of the stomach and bowels, when produced by any other cause than that of cholera, is not attended with the peculiar discharges, cutaneous congestion, and seldom by the muscular spasms, characteristic of cholera. That there is a degree of gastro-intestinal irritation I do not deny, but this is not *the* disease; it is merely an attendant of it. Extensive irritation of the whole intestinal mucous surface may, and frequently does occur, without producing any symptoms resembling cholera.

The *primary morbid impression* appears to be made on the nervous centers of organic life, the cerebral center being but little affected in the beginning. This impression is probably produced by a poison, which having gained access to the system, manifests a specific affinity for the sympathetic ganglia. The consequence is general organic enervation, and of course debility of the gastro-

intestinal canal. This debility is attended with a degree of morbid excitability which predisposes the mucous and muscular coats to become irritated; and conversely, an irritating influence acting directly on the mucous surface may constitute a predisposing or even an exciting cause of cholera, by its debilitating effect upon the splanchnic nerves. Then, when the full force of the poison is experienced in the nervous centers, an enervated and relaxed condition of the mucous membrane is the necessary consequence; and the watery and plastic portions of the blood are permitted to escape from the blood-vessels, and hence the diarrhea with rice-water discharges. The influence of the poison is doubtless felt throughout the system at the same time, producing irritability of the cerebro-spinal nervous system, as evinced by the muscular spasms, and enfeebling the circulatory apparatus. The blood is probably in some measure vitiated by the direct influence of the poison on the heart, arteries and capillaries, and thus predisposed to decomposition, while the loss of the fibrin and serum, in the copious discharges, produces increased embarrassment in both the systemic and pulmonic circulation; and the consequence is, imperfect aëration of the blood, oppressed respiration, greatly diminished calorification; stagnation of the blood in the capillaries; coldness of the surface; increased by evaporation of watery exudation from the relaxed skin; collapse is the consequence, and death results from asphyxia. All this may, and evidently does occur, without any such structural lesion as is implied in the term *inflammation* or even a high grade of irritation. Should vigorous reaction be established, *cholera is at an end*, and the irritation and inflammation to which the tissues, and especially the stomach and bowels have been predisposed by the disease, may or may not follow as sequelæ.

In describing the general symptoms of this disease, I endeavored to make sufficient distinction between the different stages. It strikes me however, that a few remarks may not be out of place here, touching the meaning of the word *collapse*, and the symptoms of the stage to which it is applied. It is somewhat vaguely employed in this relation, and hence different significations have been attributed to it. Some appear to use it as implying an entire loss of pulse and of action in every part of the body; but such a condition would be death itself. Others apply the term, and as I think correctly, to a condition of the system in which the capillary circulation is almost entirely suspended, the surface cold, the nails

purple, the skin dark-colored, shriveled and inelastic, and the pulse exceedingly small, or absent at the wrist.

This disease is so peculiar in its symptoms and the circumstances under which it occurs, that its *diagnosis* can cause but little difficulty. There is it is true considerable resemblance between the symptoms of this disease, and those presented by a severe case of *cholera morbus* or *sporadic cholera*, as it is now frequently termed; and it is a question still debatable, whether malignant cholera is not the same disease as cholera morbus, differing from it only in the presence of an epidemic influence, which predisposes the whole community to the disorder, multiplies the number of cases, and greatly increases the malignancy of the symptoms. To this last opinion I am decidedly inclined, for I have met with cases of sporadic cholera which differed from the epidemic disease only, in being isolated and in lacking the mental apathy and overwhelming severity of the general symptoms; but the character of the evacuations, the cramps, the color of the skin, the cold perspiration, the feeble pulse; in short, all the symptoms of Asiatic cholera were present, and had the epidemic influence been prevalent, I should not have hesitated in pronouncing them cases of that character, and would I have no doubt have lost them. As it was, they yielded to treatment and recovered. As a general rule then, and one sufficient for all practical purposes, the diagnosis of this malady may be based upon the prevalence, in the community, of the peculiar epidemic influence, producing a general feeling of nervous depression, and a tendency to gastro-intestinal disorders under very slight exciting causes; for whether cholera morbus is a distinct disease or not, occurring under such an influence, it will invariably assume the character, involve all the danger and demand the same treatment as the malignant disease.

From what has been already said, the general *prognosis* of this disease would be set down as unfavorable; such is undoubtedly the case where the disease is allowed to progress to the third stage. Very few patients ever rise from that state of physical prostration and mental apathy, characteristic of the stage of collapse. But in the second stage a large majority of cases yield to judicious treatment, and in the first or forming stage the disease has generally manifested a degree of tractability equal to, if not greater, than that of epidemics generally. Hence the further a case has progressed, other things being equal, the fewer are the chances of recovery. The manifestation of heroic courage, the possession of

a good constitution, and a disposition of the system to respond to remedies, are favorable circumstances; while those of an opposite character are of course unfavorable.

Treatment.—Where you have an opportunity to prescribe during the forming stage, your treatment may in most cases be quite simple. In many cases I have found the compound tincture of Virginia snakeroot, given in teaspoonful doses every hour, sufficient to arrest the diarrhea in a very short time, where the patient would lie down and keep quiet. Where the symptoms were more urgent I have relied upon the following:

℞ Tincture of opium,
 “ camphor,
 Essence of peppermint, *āā*.

Dose, one drachm every hour until the diarrhea is arrested.

This I have seldom known to fail. The patient should however, by all means lie down and keep perfectly still and composed. Indeed I have no doubt that the horizontal position, mental composure, and the avoidance of every thing calculated to disturb the stomach and bowels, would be sufficient without medicine to prevent a development of the disease in most cases, if resorted to in the choleric stage, unless there is an overloaded state of the alimentary canal. As a substitute for the tinctures just mentioned, the following powder may be given:

℞ Gum opium, pulv.
 “ camphor, “
 “ kino, “ *āā* gr. j.
 Capsicum, “ gr. $\frac{1}{4}$.

This should be repeated at the end of the first hour, and then after every evacuation. A preparation which may be termed *spiced* or *aromatic brandy* has been found very efficient also in arresting diarrhea.

℞ Pulverized Cinnamon, Cloves, and Gum Guaiacum, *āā* 3j.
 Best French Brandy, Oij.

Dose, two teaspoonfuls every hour, as long as necessary. This may be used as a substitute for the prescriptions mentioned before, or may be alternated with either of them.

If there are crude indigestible matters in the stomach, they should be removed promptly by an emetic. For this purpose the acetous tincture of lobelia and sanguinaria, aided by a warm infusion of mustard or of that and cayenne pepper, can scarcely be substituted by a better prescription. The emetic should be immediately fol-

lowed by a large dose of the compound powder of rhubarb, say one gill of the infusion every hour, until the color of the medicine appears in the dejections. If there is active diarrhea, the spiced brandy may be alternated with the doses of neutralizing medicine. After the operation of the cathartic, the discharges may be arrested if necessary by either of the preparations already named. Or what will be sufficient in most cases, tincture of catechu, or kino and paregoric combined in equal parts, may be given in doses of two drachms, after each discharge. Or instead of the catechu, kino or any other astringent, I prefer the marsh rosemary, (*static limoneum*), if it can be obtained. This may be given in doses of two ounces alone or with a teaspoonful of paregoric, after every motion of the bowels.

Instead of the compound powder of rhubarb, some of our practitioners have given the compound powder of senna and jalap with good results. If there is torpidity of the liver, as shown by the character of the discharges, small doses of podophyllin and leptandria may be given, say pod. gr. $\frac{1}{4}$, lep. gr. $\frac{1}{4}$, and repeated once in three or four hours, until bilious evacuations are produced. But should there be severe diarrhea, it will be best to check it at once with one of the preparations named for that purpose, without waiting for the cathartic to operate.

If the case has reached the *second stage*, your treatment will require to be characterized by much promptness and energy. Here also if there is nausea and evidence of accumulations in the stomach, the emetic is indicated and should be given so as to produce the most prompt and thorough action. The same articles mentioned in the first stage may answer the purpose, but I prefer a combination of common salt and cayenne pepper, prepared as follows:

R Common salt 3j.
Pulverized capsicum 3j.
Boiling water Oss.

Dose, a wine-glass every ten minutes, aided, if necessary, with mustard tea, until thorough emesis follows.

I have seen the most satisfactory results, in some cases, follow the use of this prescription; the discharges from the bowels have stopped, cramps have ceased, and all untoward symptoms have terminated with the operation of the emetic. This, I am aware, is an off-handed prescription, but is none the worse for that, especially if successful.

After the emetic, if one is given, and if not, then as a first

indication, *check the diarrhea*. The patient must by all means, be kept in bed, and as quiet as possible, and he should be instructed to resist the tendency to motion of the bowels, and if necessary, assisted in this by an attendant, pressing a thickly folded towel against the anus. Hot bricks should be put to the feet, and a strong sinapism placed over the entire abdomen. While these measures are being applied, the patient should take internally the sudorific tincture; the tincture of opium, camphor and peppermint; or the powder of opium, camphor, kino and capsicum. But whichever is given, the dose should be larger, and repeated at shorter intervals than directed in the first stage. If narcotism is apprehended, from the frequent repetition of doses containing opium, the aromatic brandy may be given alternately, which is, indeed, a highly judicious practice in most of these cases, as there is nearly always a tendency to sink rapidly into a state of prostration, which the spiced brandy may prevent.

While the foregoing treatment is being employed, stimulating applications should be made to the whole length of the spine, with a view of arresting the *spasms*. The tincture of cayenne may be applied to this region by brisk rubbing with the hand, or with flannel, and followed by a sinapism extending from the top of the coccyx. Dry heat and friction should, at the same time, be applied to the whole surface, and especially to the extremities. Hot bricks, or irons, should be kept to the feet and hands, and bottles of hot water, or bags of hot sand or salt, should be placed along the limbs and body. As a stimulant application to the surface I have usually employed dry cayenne briskly rubbed upon the skin, and then dampened with cold water. This is the most prompt and unfailing method of producing reaction in the skin, that I have ever tried. Where a muscle is drawn into a knot, pressure and friction should be made upon it until the spasm yields. Much relief may be afforded to the patient in this way.

To *allay the nausea*, so generally present, the compound neutralizing physic, in teaspoonful doses of the infusion, every half-hour, is of great value. Instead of this, the following prescription has been employed with excellent effect:

R. Aqua camph.

“ Menthæ viridis (spearmint).

“ Menthæ piperita (peppermint), *āā* 3j.

Tinc. opii. camph. 3ij.

Mix, and give ten or fifteen drops every 15 or 20 minutes.

To overcome the torpidity of the liver, so common in cholera, small doses of podophyllin and leptandrin, as directed in the forming stage, should be given. The administration of this medicine may be commenced as soon as it will lie on the stomach, and the dose repeated once in three hours, until the biliary secretion is aroused. Little good, however, will result from any efforts to reach the liver while the diarrhea is continued.

Let it be borne in mind that, whatever may be the mode of treatment adopted, every effort must be vigorously made. Nothing is to be deferred to the next hour that can, with propriety, be done in the present, and no hope is to be entertained that the disease, having spent its force, will release its grasp. A vascillating or capricious resort to various remedies should be avoided. Some practitioners become so excited in treating cholera, that they fly from one remedy to another, without taking time fairly to test the efficacy of any. You should keep perfectly cool and self-possessed—your own safety demands this—and having decided on your mode of treatment, follow it up with energy. If an agent known to be potent, fail at first, repeat it; if it fail again, repeat it once more, and thus by dint of perseverance you will often finally secure the desired result.

If, under the foregoing and kindred measures, the collapse comes on, little can be done except to continue the treatment, with, if possible, increased activity. If the patient is already in the third stage when you are called, commence, and continue the application of the internal and external measures already described; and although the probabilities of cure are very much diminished at this stage, you may possibly be successful.

The course I have now described is that pursued by myself, and in view of the results, as compared with those obtained by other practitioners, I feel safe in recommending it to you. That it will save all your patients, I do not pretend to hope, but that it will, if vigorously carried out, relieve all cases which can be cured by any means hitherto employed by the profession. The formulæ employed have been derived from various sources, and several other measures might have been enumerated, which I have tried, and some of which have been earnestly recommended by others; but I have aimed to mention those only which have seemed to be efficient, in my practice, in meeting the indications for which they were prescribed. I will now present you with synopses of the modes of treatment recommended by certain practitioners, whose

extensive experience and eminent success in the management of this dreadful malady, entitle their suggestions to much consideration.

I will read first, extracts from a Lecture delivered by the late Professor MORROW, in this Institute, and published in the Eclectic Medical Journal, Vol. I., p. 277.

"The treatment pursued in each individual case, was regulated by the condition of the patient at the time of being called. In a very large majority of the cases that came under my notice, the patients were affected with diarrhea, great prostration of strength, nausea and vomiting, with slight spasms. In the early periods of such cases, the patient was directed to go to bed, if he or she had not already done so, and was directed to take freely of the neutralizing cordial preparation, composed of equal parts of rhubarb root pulverized, saleratus, and peppermint plant, powdered; one pint of boiling water being added to half an ounce of this compound. After simmering it for half an hour, it was well sweetened with white sugar, and strained, and when nearly cold, two or three tablespoonfuls of good French brandy were added, and the patient was directed to take this warm, every fifteen or twenty minutes, in doses of two tablespoonfuls, in connection with a preparation, made by adding one ounce each of pulverized cinnamon, cloves and gum guaiacum, to one quart of good French brandy, in doses of from two teaspoonfuls to a tablespoonful every twenty minutes, to an adult, placing immediately around the body of the patient hot bottles of water, hot bricks or stones, and covering the patient well in bed with a suitable quantity of warm clothing. This course will soon produce a warm, copious perspiration, which should be continued for six or eight hours at least, and if the case is a severe one, a moderate moisture of the skin should be kept up for a longer period.

"This course usually puts an effectual quietus on the nausea, vomiting and diarrhea.

"This plan of management is nearly positively certain of success, if properly carried out in every case, in the earlier stages of its progress, and, as a general rule, there is but little difficulty in carrying it into the desired extent of operation, in fulfillment of the great indications for which it is intended.

"In those cases, however, which were marked by strong spasms and violent vomiting and purging, from the commencement, and which had not already passed into the stage of collapse, or if this

train of symptoms was present at the time of seeing the patient, whether the attack commenced with them or not, I usually commenced the treatment with an emetic of the following compound: Take of saturated acetous tincture of *sanguinaria canadensis*, of *lobelia inflata*, tinctured in the same manner, in vinegar, and spirituous tincture of *aralia spinosa* (southern prickly-ash), equal parts, and give it in doses of from one to two tablespoonfuls or more, mixed in a little warm water, or hot tea, sweetened, every ten minutes, till it vomits the patient freely five or six times. This, in all cases, seemed to exert a powerful controlling influence over the subsequent course of the symptoms of the numerous cases in which it was used. Perspiration was much more readily induced, and continued without the necessity of using a course of measures so efficient as those first indicated, or rather under the same, less vigorously applied.

"A preparation composed of equal parts of the oil of peppermint, cloves, anise, and cajeput, with a quantity of alcohol, equal to one-half or a little more than one-half of this mixture of the oils to cut them, and allow them to mix intimately, was found to possess a high degree of value in the treatment of severe cases of cholera. This, I understand, was a favorite remedy in the treatment of this disease, in 1832, and was extensively used by the late Dr. Anthony Hunn, a celebrated medical Reformer, of Kentucky, and is still known by the name of 'Hunn's Life Drops,' in some parts of the country. In several very severe cases, this compound manifested great controlling powers, in doses of from one teaspoonful to a tablespoonful every 15 or 20 minutes, mixed with half a glassful of hot brandy-sling. In one case in which the patient was in violent spasms in all the flexor muscles of the body, with the thighs drawn up against the abdomen, and the legs against the thighs, the neck and head forward on the breast, with a violent state of contraction of the abdominal muscles, two teaspoonfuls of this compound were given with apparently but little effect, but this was followed in ten minutes by a tablespoonful, which soon effected the desired relaxation, and relieved the patient. He described the influence as very powerful, and penetrating even to the extremities of his toes and fingers. This powerfully concentrated medical compound manifested very superior powers in those cases in which the patient was rapidly approaching the state of collapse, or even in the earlier periods of that stage, accompanied at the same time with obstinate nausea and vomiting, as

well as profuse rice-water discharges from the bowels. In several cases, after the relief of the spasms, nausea and vomiting, an obstinate and moderately profuse diarrhea still continued, one-half to a teaspoonful of this preparation was given with complete success.

"There were several cases of this complaint, in which, after vomiting, cramps, and pains were all relieved, the patient was annoyed with a frequent desire to have a discharge, but could only pass a little slimy mucus, similar to the discharges in dysentery. From ten to fifteen drops were given every hour, with almost invariable success in cases of this kind.

"In one or two cases of collapse which were treated by me, I found the sudorific tincture a most invaluable medicine, given in doses of a teaspoonful every fifteen or twenty minutes, in a little hot catnip or peppermint tea. It quieted the deep-seated nausea and distress, and restored the lost circulation with singular energy and promptitude.

"The application of blankets over the whole body, as hot as could be handled, often dipping them in boiling-hot water, was found to exert a most beneficial influence. The rule adopted in reference to their use, was to wring them partially dry after immersing them in the water, and then apply them by wrapping them around the patient's entire body, leaving the head and neck free, and covering him over with dry bed clothing, and allow them to remain usually fifteen or twenty minutes, when they should be taken off and new hot blankets applied as at first. Reaction and a copious perspiration generally took place in the course of an hour or two after commencing these applications, especially when aided by the use of proper internal stimulants, anti-spasmodics and sudorifics.

"The extract of *plantago cordata*, also manifested powers of no inconsiderable value, when given in the form of pills of two grains or more at a dose, and repeated in the course of an hour, in common cases not marked with symptoms of unusual severity, for the purpose of quieting the nausea and vomiting, and arresting the diarrhea. The results which have been consequent on the course of practice above indicated, have been highly satisfactory."

A vast amount of statistical evidence of the success attending Eclectic practice, in the management of cholera, might be derived from the reports of individual practitioners; but these may be found in our medical Journals, and it seems unnecessary to occupy your time by reading them here. Suffice it to say that, after

making ample allowances for what is challenged, by some, as exaggerations,—a charge, however, which is as likely to be merited by old-schoolmen as by Eclectics—there can be no reasonable doubt in the mind of the impartial inquirer, that success greatly preponderates on the side of the anti-mercurial mode of treatment. There is, however, one report, which coming from a public institution, in which the Eclectic practice was tested, and emanating officially from the hand of a responsible, public functionary, may be regarded as testimony to which no objection can be raised. This report, gentlemen, I propose to read; it may be found in the Eclectic Medical Journal, Vol. 1, N. S., p. 410.

“ Report of Dr. J. H. JORDAN, Attending Physician of the Cincinnati Cholera Hospital, to the Board of Health.

“ GENTLEMEN :—

I have the honor of submitting the following as a report of the Fourth Street Cholera Hospital of Cincinnati, for the time of my connection with that Institution—being from the 6th of June till the 18th of August—the period of its suspension :

There were admitted as patients, from the 6th to the end of June	100
During the month of July	139
From the 1st to the 16th of August	27
	<hr/> 266

These may be classified as follows, so far as known :

NATION.	No. Admitted.	Males.	Females.	No. Deaths
Irish	92	65	27	31
German	83	58	25	41
American	40	31	9	13
English	24	21	3	4
French	5	4	1	3
Scotch	4	4	0	0
Colored	4	3	1	2
Italian	1	1	0	0
Welsh	1	1	0	1
Unknown	12	12	0	5
Total	266	200	66	100

“ By estimating the aggregate mortality from *all causes*, and the relative proportion of deaths and cures, we have the following :

Whole number of admissions	266
Whole number of deaths	100
Whole number cured	166

“Showing a mortality in proportion to the number of admissions, of 37.59 per cent., which for convenience may be styled *three-eighths* or $37\frac{1}{2}$ per cent. Such are the aggregate results, for which, however, other causes than cholera are, to a considerable extent, responsible.

“As this hospital was established expressly for the reception of cholera patients, and as much interest is felt in the result of the treatment of that disease, it is necessary to exhibit distinctly the mortality which may be fairly ascribed to cholera, and the ratio of mortality *among those who were treated for cholera* in this hospital. By doing this, we can ascertain the exact degree of success which has attended our efforts for the relief of that disease, and learn to estimate its probable mortality in future attacks.

“We must therefore estimate the number of those who can not be regarded as cholera patients, which is as follows: Among the deaths, there were five who died of *narcotism* from drugs taken previous to admission; three who died of *delirium tremens*; five who died of nervous fever (more properly speaking, perhaps, of *opium* fever); and eight who died of ‘other diseases’—making twenty-one. These of course should not be reckoned in the account as cholera deaths. In addition to these, there were five others that were not strictly cholera cases—four of whom were cured, and one remitted to the Commercial Hospital—making in all twenty-six. Not reckoning these in the account, the mortality will be found a fraction less than 33 per cent. or 32.9. This, it will be seen, is but little more than one-half as great a mortality as has been exhibited in the treatment of cholera this year in the hospitals of Paris, although attended by the most eminent men in the medical profession.

“But there is another fact which must be mentioned. Besides the foregoing twenty-six cases, there were thirty in *articulo mortis* when admitted, who died on an average in less than an hour.

“That there should be so large a proportion of the cases in *articulo mortis* when admitted, may excite some surprise—unless the statement be accompanied with an explanation. A number were brought to the hospital in this condition from steamboats immediately on their landing, having lain in a state of collapse frequently for hours previous to their arrival at this port. Some were in this

condition when found, by the ward committees and benevolent individuals who interested themselves in behalf of the poor, and were brought here in the vain hope that they could be cured. But I am compelled to say, that a large proportion were cases that had been treated by physicians until past all hope of recovery, and then sent here *by those physicians*, or by their directions. As it could not be expected that such a measure could be of any service to the patients, and it could only serve to increase the apparent mortality of the hospital, I leave it to others to conjecture the motives of such a course.

"By substracting this number also from the number of admissions and deaths—and it is but just to do so, as I can not be held responsible for cases that were too far gone when received to admit of treatment—we are enabled to arrive at the true number of cholera cases treated, together with the exact number of deaths among the same, which are as follows:

Whole number of cholera patients treated.....	210
Whole number of deaths.....	49
Discharged cured.....	161

"Comparative results: CURES, 76 $\frac{2}{3}$ per cent.; DEATHS, 23 $\frac{1}{3}$ per cent.

"In comparison with other hospitals of the kind, this would be regarded as a small mortality; and yet the greater portion of these deaths were due to the advanced stage of the disease in which the patient was received. If all had been removed to the hospital upon the first appearance of cholera symptoms, I am convinced the mortality would not have exceeded 10 per cent.—probably much less.

"That this hospital was placed under the most unfavorable circumstances amid the ravages of an unusually severe epidemic, is evinced by the fact that between an eighth and ninth of all the patients admitted were actually dying when received, and lingered generally less than an hour; and that about an eighth of all that were cured, or TWENTY, were, when admitted, in that extreme and pulseless collapse, from which recoveries are rare. Under these unfavorable circumstances, it could not be expected that the results of the treatment would have been as successful in the hospital, during the severest period of the epidemic, as they were, or should have been, during the milder form of the disease in the month of May, and under the more favorable circumstances of private practice; yet if we compare the true cholera mortality of the hospital,

throughout the severest period of the epidemic, with the mortality of private practice as reported to the Board of Health during the month of May, the mortality of the hospital will be found scarcely equal to that of private practice.

"On the other hand, if we compare the mortality of cholera patients in the Cincinnati Hospital with the mortality of cholera hospitals in Paris, attended by the most learned and distinguished medical faculty in the world, we find the treatment in the Cincinnati Hospital has produced far the most favorable results—the ratio of mortality being less than one half as great as the mortality in Paris! (The cholera mortality of the Parisian hospitals, according to their reports in May, was 62 per cent., nearly three times as great as that of the Cincinnati Hospital.)

"When this hospital was established, it was expected that a mortality of 50 or 60 per cent. would characterize its reports; we have therefore great cause to rejoice at these unusual *results*, and it may not be amiss to inquire into the cause of so gratifying an issue to our labors.

"I have not the vanity to claim any peculiar talent, skill or any other merit, except a conscientious discharge of my duty. Whatever credit may be attached to these results, must be ascribed mainly to the principles of treatment which were adopted and faithfully carried out—principles which have stood the test of many years' experience in this country, and have never yet failed to demonstrate their superior value. These principles have been derived from the ECLECTIC or AMERICAN system of medicine,—a system peculiar to our own country, and widely distinguished in many respects from the old-school or European system, which claims a foreign and antiquated origin. The Eclectic system, which excludes mercurials and general depletion by the lancet, as well as many other injurious agents, both in this and in all other diseases, recognizes a variety of stimulating, sudorific, diuretic, astringent, alkaline, antispasmodic, cholagogue, and emetic remedies, as appropriate in the treatment of cholera; and aims to substitute safe, simple, and sanative agents for those which tend to create or aggravate disease by their own poisonous nature, or to produce permanent debility.

"It will not be expected, I presume, that I should give a detailed report of the treatment on the present occasion. To do so, would make a voluminous document, only appropriate to the pages of a medical journal. Should the epidemic threaten to visit our

country again, I may select something from my experience and observations suitable for publication, for the benefit of the public, in regard to the prevention and cure of this disease. For the present I will only remark, that the course designated by the above general terms, was adopted and thoroughly carried out. I will add, however, that my experience in the hospital has rendered me still more averse to the use of pernicious drugs, and more in favor of a mild and simple practice. By far the worst cases to treat were those which had previously been drugged with opiates and mercurials. Even the state of pulseless collapse, unmodified by any medicine, was far less formidable to encounter than a condition less advanced in the disease, but laboring under the influence of mercury and opium.

"A majority, if not all the twenty who recovered from a state of collapse, had received no treatment of consequence previous to admission.

"As to the *cause* or *theory* of the disease, so much has already been said by medical writers, that it is needless to accumulate additional speculations. That the liver, however, is not the seat of the disease, nor its derangement the cause of it, either remote or proximate, my experience has abundantly satisfied me. Hence, the impropriety of giving calomel or harsh cholagogue medicines. Such remedies, in a milder form, may frequently be necessary in the convalescent stage, but in my opinion are never indicated until after the formidable symptoms of the disease are subdued. I conceive it one of the fatalest and most unpardonable mistakes to ascribe the disease to a derangement of the liver! Remove the cause and restore a healthy action of the system, by means of stimulants, sudorifics and alkalies, aided, if necessary, by external heat; allay urgent symptoms, if present, by the use of astringents, anti-spasmodics, and outward applications in the form of sinapisms and rubefacients; do this, and in nine cases out of ten the liver will take care of itself; at least, such has been my experience.

"The experience of this Hospital, I believe, fully proves that the cholera, if rightly treated, is not so formidable a disease as has generally been supposed. I must confess, however, that much depends upon promptness and early treatment. Guided by experience in this matter, I would therefore respectfully suggest to the Board of Health, that in any future invasion of cholera, the public safety requires that every family should be supplied with some safe and efficient cholera remedy, accompanied by brief directions as to

diet and other things. By pursuing such a course the premonitory symptoms could be promptly met—but few cases would assume a formidable type, and the loss of life might be reduced to an inconsiderable amount, compared with the usual mortality of this disease. Any knowledge of this kind in my possession, I shall be happy to furnish to the Board, at any time, if desired.

“In conclusion, gentlemen, I must acknowledge my obligations to you for your hearty coöperation—the efficient aid I received at your hands, and the promptness with which you responded to every call in behalf of the Hospital. Your laudable and efficient endeavors in behalf of the afflicted destitute during the late epidemic, at the sacrifice of time and private interests, not only at the Hospital, but on any and every occasion, richly entitle you to the gratitude of your fellow-citizens. Such devotedness to duty, and the cause of suffering humanity, should not, and I trust will not, go unrewarded.

“I am, gentlemen,

“Your obedient servant,

“J. HENRY JORDAN, M. D.,

“Resident Physician.

“CINCINNATI, Aug. 18, 1849.”

And now gentlemen, I have detained you long enough with this subject. I might spend hours in presenting the various theories, speculations and remedies, which have, from time to time, been submitted to the public, but it would be a sheer waste of time. I believe you are now in possession of all the really valuable knowledge which has as yet been attained, and more than this you do not desire—idle or visionary speculations are not what you seek from my lips, and to such I shall not ask you to listen. That much is yet to be learned, in reference to this modern scourge of the nations is most certain, and to you lies open the broad field of research. As intimated in the lecture of yesterday, it is highly probable that you will be called upon during the next summer, to measure arms with this giant disease. Your position will be that of danger and responsibility, but I trust you will exhibit that true courage which should characterize the enlightened and philanthropic physician, and that while you guard well your own health, and labor to save the lives and mitigate the sufferings of community, you will make such observations as will enable you to add to the common stock of professional knowledge, in regard to the nature and management of epidemic cholera.

LECTURE XXXVI.

LOCAL DISEASES—CONTINUED.

Introductory Remarks; Symptoms; Case of Milk-Sickness; Treatment; Character; Cause; Nature; Treatment; Note; Other Cases; Quotation from Dr. Haynes; Dr. McCall's Views; Cause; Treatment.

MILK-SICKNESS—SICK-STOMACH.

Before leaving that group of diseases involving the gastrointestinal mucous surfaces, I desire to call your attention this morning to the consideration of another disease in which those parts are more or less affected. It will no doubt be to you, as well as to a large majority of the profession, an entirely new disease. You will find it described in none of the authorities, and so far as I have observed, not correctly described by any of the periodicals, except in one or two instances. It is usually called *milk-sickness*, and has been styled, in some sections of the country, *sick-stomach*, from the fact that this is the leading symptom of the disease, at nearly every stage of its progress. It is a peculiar disease, and I am quite convinced is *sui generis* in its character, essentially differing from any disease heretofore described in the books. It is considered by some physicians who have come in contact with it, to be merely a modification of bilious fever. But after hearing a description of it and noting the striking dissimilarity between the symptoms of this disease and bilious fever, I think you will conclude with me that it is totally different from the latter, produced by a different cause, and in short is altogether a nondescript. During an extensive practice for upward of twenty-four years in malarial regions, where almost every modification of bilious fever has from time to time presented itself, I have never seen any thing, aside from the few cases of the disease itself, to which I shall presently refer, that suggested even a suspicion of the existence of symptoms similar to those of milk-sickness. If it is a modification of bilious fever, I certainly would have seen some of its characteristic symptoms in some of the numerous cases of malarial disease that have come under my observation; or the

books, in describing the latter, would have contained the leading train of symptoms, from which I could have inferred that milk-sickness was allied, in some masked form, to bilious fever. But as I have already said, you will not find it described in any of the books, and the only reference to it that I have seen has been in newspaper squibs, or in some remote and obscure periodical of the times. I have heard that an article upon the subject was written by Dr. Drake, some years since, but I never saw the article myself. My first experience therefore, and in fact my only experience in the disease, was derived from witnessing a few cases many years ago. I had barely heard at that time some traditional accounts of it from persons who had lived in the vicinity where it had occurred, and as it had not been known in the region of country to which my practice had been confined, I paid but little attention to those statements until called to see my first case.

Perhaps I can not give you a better idea of the disease itself, than by detailing the history of this case, and some of the others I subsequently treated. The first case occurred in the winter of 1830. I was called about five o'clock in the morning to see a patient who had arrived the previous evening in a jumper, or off-hand sleigh, from Marion, Marion county, Ohio, about forty miles from Worthington, where I then resided. On arriving at the house where he put up, I learned that he had had an attack of the same disease early in the preceding fall, and this was the first time he had been able to leave home. His system was still enfeebled from the effects of the disease or the medicine, chiefly as I believe from the latter, and he, afterward, became convinced of the same thing. But whichever was the case, and whether it was on account of either or not, his present attack as he said was far more violent than the first. He was opposed to calling a physician for two reasons; one was, that he had no confidence in any one who had no experience in the treatment of the disease, and the other was, that the only physician in whom he had confidence, was the one who had treated him before, and who as he thought had saved his life. That gentleman was then in Columbus, about nine miles south of where we were, and was expected through our place on the next day. The patient therefore concluded to bear his sufferings as well as he could until the physician should arrive. But the symptoms developed rapidly, and his sufferings became intolerable. I was therefore sent for, and I found the patient in the condition I will describe.

He was naturally a strong, healthy, vigorous man, by the name of Calvert, a tavern-keeper in Marion. At the time of his first attack, his physician, whether he considered the disease a peculiar one, or a modification of bilious fever, seemed to think the only indication was to produce an active cathartic action and the constitutional influence of mercury. Consequently he continued the use of calomel for several days, without any perceptible effect, and finally had recourse to rubbing the gums with corrosive sublimate, which resulted in producing two large depressions or holes in the tongue, which had healed over, and in which I could easily lay the end of my finger. The whole internal lamina of the lower jaw had sloughed off, leaving his teeth exposed down to the end of the roots, and yet this individual *supposed* the physician had saved his life. He had recovered his strength sufficiently to start for Columbus, and when about eight miles from Worthington, the previous evening, he felt the uneasiness in the stomach peculiar to the disease. This gradually increased into a positive nausea and burning sensation in the stomach, which though it did not then produce emesis, completely prostrated him so that he fell back in his sleigh, and in that condition he reached the tavern. Soon after his arrival, he commenced vomiting and thus I found him on entering the room. As soon as he had vomited, he fell back on his pillow apparently easy and free from nausea. The appearance of the discharge was very peculiar, having a bluish-green color and a perceptible acid odor. After lying apparently easy for ten or fifteen minutes, he began to complain again of the burning uneasiness in the stomach, became exceedingly restless, turning from side to side and throwing his limbs about, seemingly in the greatest distress, until at length he threw up precisely the same kind of fluid as on the former occasion, and then again fell back perfectly free from uneasiness or pain. I sat there examining his pulse, looking at his tongue, and inquiring into the history of the case, and the nature of the symptoms, for an hour and a half before I was able to form an opinion on which to predicate a course of treatment. I found a small and rapid pulse, though not as rapid as we find in gastritis, with coolness of the extremities, no unnatural heat of the surface, nor much thirst. The tongue was thickly covered with a whitish coat, but there was no redness of the edges, and no great tenderness of the epigastrium upon pressure. The bowels were obstinately constipated; the urine was decidedly diminished in quantity, but not of that red color

common to most inflammatory diseases. The skin was dry, but not husky as in inflammatory diseases of the stomach. In about ten or fifteen minutes the uneasiness in the stomach began to return; the burning sensation then increased until the same peculiar substance was thrown off, which he complained of as being exceedingly acrid and irritating, comparing it to the oil of vitriol. His countenance had a pale and anxious expression, though not of that sunken and exhausted appearance common to inflammation of mucous surfaces. The respiration was rather slower than natural, and a little irregular at times.

This patient recovered immediately upon the treatment which I shall presently describe, and was able to return home in three or four days after I first saw him; not venturing to prosecute his journey to Columbus. He was favorably impressed with my treatment, as contrasted with that he received in the first attack, and the more so as the last attack was much the severest. Of course he did not fail to herald the matter on his return, and the consequence was that I was sent for in a short time to see two patients in Delaware, a town in which there was a surplus of resident physicians. The disease was rife in that neighborhood. These two individuals, a mother and daughter, were taken simultaneously, and in each case the attack was brought on by eating some butter procured from the table-lands lying west of Delaware, in the township of Radnor; a region which became so notorious for producing milk-sickness that the inhabitants of Delaware would never purchase the butter manufactured there at certain seasons of the year. The symptoms in these two cases were precisely the same as in the case already described, except the old lady was more infirm, and her system less able to resist the encroachments of disease. She had been given up by the attendant physician to die, and when I saw her was almost pulseless, the extremities cold, and her strength so exhausted that she could not raise her head or articulate aloud. She was still vomiting, the eyes were sunken, and there was every appearance of a rapid and fatal result. The daughter was not so far gone. They had both been sick forty-eight hours, but the daughter still had considerable strength, and could satisfactorily describe her symptoms. The appetite in all these cases was entirely suspended.

The general character of this affection and the diagnostic symptoms of bilious fever render it by no means difficult to distinguish the two diseases. If the disease is not developed *immediately* after

taking the article which causes it, the first symptoms will be lassitude and listlessness, somewhat characteristic of the forming stage of fever. But in any stage of the disease there are no morning remissions and evening exacerbations, no peculiar pains in the extremities and back, and no bilious vomiting as in those cases of fever in which vomiting is a prominent symptom. And what is remarkable, very little febrile reaction supervenes upon relieving the urgent symptoms of the case. The pulse rises in fullness and diminishes in frequency. The only disease to which it bears any resemblance is inflammation of the mucous surface of the stomach, from which however, it will always be distinguished by the peculiar appearance of the matter thrown up, and by the absence of febrile reaction, in this affection.

In view of these facts, can any one who is familiar with bilious fever suppose for a moment that milk-sickness is a modification of that disease? If these are not sufficient to settle the question, there are other facts worthy of consideration, especially as connected with the cases of which I am speaking. It is well known that Delaware occupies a very healthy site, and is extremely free from the miasmatic fevers of the West. The surrounding country is hilly, and owing to the abundance of sulphur springs, and the salubrity of the place, it is a common resort, during the summer months, for persons wishing to recruit their health. Besides this, every case of milk-sickness that occurred in Delaware could be referred to an immediate known cause. In every case it was ascertained that the patient had eaten, either the flesh of cows or cattle that had fed upon an unknown weed or vegetable, or upon the flesh of calves that had suckled cows afterward affected with the trembles, or upon the milk, butter, or cheese of such cows. This fact not only helps to distinguish it from bilious fever, but throws some light upon its cause and will be referred to again.

It may be asked, what is the *nature* of the difficulty? I reply that, although I have never witnessed post-mortem examinations of patients who have died of this disease, yet all the symptoms indicated a low grade of irritation confined to the stomach and not amounting to inflammation. During the whole progress of the disease, I discovered no symptoms of inflammation, nor did the bowels become involved; on the contrary, they were always constipated. The discharges from the stomach were never bilious, but always acid and of an acrid character. I did not test the discharges in the cases to which I refer, but the descriptions given by

the patients of their smell and taste were to this point. I regret now that I was not more careful in my investigations of their character, but in my early experience in the treatment of diseases, my main object was to cure them. It is however, evident to my mind, that the matter thrown off from the stomach is a secretion or effusion flowing from a low kind of irritation which is set up by a specific local poison in the stomach. I am justified in taking this position by the symptoms developed during the progress of the disease. As soon as patients have vomited they lie down relieved and perfectly easy, and can tell almost the very moment when the accumulation commences again. I was particularly struck with this fact in my first case, and noticed it in every subsequent one. The patient gradually becomes worse and worse, until the system is exhausted and overcome, or reaction takes place, the influence of the poison is removed, and the patient recovers.

I believe no well-settled or generally satisfactory explanation of the real cause of this disease has been offered. Every individual naturally tends to some kind of a conclusion, though it may not be sustained by facts. Some refer it to this plant and some to that. If I am not mistaken, the Legislature of Ohio once offered a reward to any one who would discover the real cause of trembles in cattle. The effects produced by eating the flesh, milk, butter, etc., of cattle affected with the trembles, to which I before alluded, have led to the supposition that that disease in cattle and the milk-sickness were produced by one and the same cause. Now it is not unreasonable to suppose that trembles may be produced in cattle after eating the *Rhus Toxicodendron* or *poison ivy*, an article which is also sometimes administered in cases of paralysis for the purpose of producing muscular action, or arousing the nerves concerned in muscular action. It is possible that this is the plant which has caused all the mischief; another circumstance also points to the same conclusion. It is said that cattle confined to pastures of tame grass never have the trembles, and that the disease in the human system has never occurred from eating the flesh or milk of animals thus confined. But it occurs at particular seasons of the year, when the weather is extremely dry and green vegetation scarce, and is most common among cattle that graze in the woods, on the borders of prairie and table-lands where this plant abounds and presents a tempting appearance to hungry cattle, on account of its peculiar verdancy. This together with the history of the disease so far as known, and the traditions prevalent

in regions where it is most common, have led me to suppose that its origin may be found in the poisonous properties and effects of the *Rhus Toxicodendron*. I throw this out however, merely as a suggestion, and not as a well-attested fact, and I give it to you for what it is worth. Of course my opportunities for investigating the disease or its origin have been too limited to warrant any great degree of confidence in this theory.

It is after all perhaps of equal if not greater practical importance to select a successful *remedy* for the disease. On this point I am prepared to speak with more confidence, and I will now detail the course of treatment which I pursued in the few cases I was called to attend, remarking at the same time that I would not press it with undue earnestness, but merely recommend it as valuable until a better is discovered. The remedy which I found most efficient in neutralizing the acidity, and allaying the irritation of the stomach, was our neutralizing physic. I had no case in which the patient vomited after its administration. Its composition seems to be precisely suited to the condition of the stomach, and should be given in tablespoonful doses every time the peculiar burning sensation is felt. In the first case I treated, I first gave, by way of experiment, a dose of the white liquid physic—a preparation of rochelle salts, nitrate of potass. and a small portion of muriatic acid, but this added only fuel to the fire, and the patient complained that it made him worse. I next gave him the neutralizing mixture. Its effects were immediately and plainly visible, and the patient remarked, with much satisfaction, that I had “hit the nail on the head that time.” Every time the burning sensation was felt, I gave him a spoonful of the medicine. This was the main reliance, although I thought it well enough to apply sinapisms to the stomach, and hot bricks to the feet, and I kept him still for a number of hours until the stomach was entirely relieved. Afterward, to gratify his desire more than any thing else, as he thought it strongly indicated, I gave him a cathartic. I have not forgotten the peculiar wording of his request—he wanted “a physic that would operate like a saw-mill!” I gave him a large dose of the antibilious physic, and it fully answered his expectation. The next day he was able to be about the house, and on the next set out for home. The other cases which I mentioned, were treated in the same way, except that I did not give a cathartic to the old lady, on account of her exhausted condition. Finding it necessary in her case, to recuperate the system as fast as possible, I bathed her surface

with stimulating liniments, and gave her at the same time a little beef-tea. I also directed the administrations of injections, which, by the way, is a very safe measure for evacuating the bowels when great irritation of the stomach exists, and I would recommend it under most circumstances. By these measures and fomentations she was in a short time soothed into quiet and refreshing sleep, the circulation returned, and before noon of the next day reaction had taken place, and she was in a comfortable condition. Of course it required longer time in her case to repair the system, but the daughter was up and about the house in a short time in usual health.

I would further add in regard to treatment, that you should never allow the stomach while irritated to be overloaded, even with water, or your treatment will be thwarted. The diet should be of the mildest possible kind: mere rice-water or gruel; until all the symptoms have subsided.

In conclusion, I would remark that in all the cases which I have treated, amounting in all to eight or ten; there was a striking similarity in the symptoms, requiring but little modification in the treatment, and all recovered promptly. I do not wish to exaggerate the benefit of this mode of treatment, but I have thought it due to you, and to the world, to give my experience, being ready at the same time, to adopt with alacrity any superior measure which future experience may develop. Every practitioner should take upon himself, not only for his own benefit but that of the profession generally, to communicate, through the periodicals, or otherwise, any peculiar features of disease that he may meet with, or any successful remedies he may discover.

[NOTE.—Since this lecture was delivered, in casually turning over a few numbers of the "Philadelphia Journal of the Medical and Physical Sciences," for the year 1822, edited by Professor N. Chapman, I found in one of them descriptions of the milk-sickness, by three different physicians. It seems these communications were first published in the "Western Quarterly Reporter," at Cincinnati, and were quoted from that paper by the editor of the Philadelphia Journal. These communications, it will be seen, perfectly coincide in their descriptions of the disease with my own observations. I reproduce the shortest one, and will make a few extracts from others in relation to the *cause*, etc. The shorter article was written by a Doctor Haynes, of Dayton, Ohio, and is as follows:

"This disease prevails chiefly in the neighborhood of heavily timbered, level, and consequently rather wet oak land.

"Cattle, sheep and horses, which range in these tracts, are subject to a peculiar disease, known among the people by the name of *trembles*, which they suppose to be produced by their eating a plant, as those animals which range in the neighboring barrens or beech land, are free from the disease until they find their way into these low bottoms; and so well are the people acquainted with this fact, that if they see cattle that have been accustomed to range in the barrens, enter these suspected ranges, they foretell the sickness of the calves, and of the family using the milk. Calves are seized with trembling and vomiting during, or soon after, sucking, and frequently die of the disease. The milk has the same effect upon dogs. Children drinking the milk, leave the table and vomit. Upon adults its effects seem to be less sudden, but eventually more severe. It seems somewhat singular that milch cows escape the disease, while their milk produces it in other animals. It seems as if the deleterious matter was emanated from their systems through the lactiferous vessels.

"Beef and mutton produce the disease. Several instances have been related to me, in which beef and mutton killed in the neighborhood before mentioned, have sickened all who ate of them. Some who have had the disease, say they can instantly discover, by a peculiar taste, such beef or milk as will produce the sick stomach. Dogs eating the flesh of those animals which die of the *trembles*, as it is called, sicken and die with vomiting and that extreme debility characterized by trembling and inability to stand or walk.

"If cows are kept in pastures, and not suffered to run in the woods, their milk may be used with impunity. That there are difficulties in admitting the opinion that this disease is caused by some vegetable poison, and in proving it to be true without a direct experiment is acknowledged; but taking into consideration the testimony that has been advanced, and the almost universal sentiment of the people who have experienced the disease, and have had it in their families, there appears to be much probability; and an opinion so general as this is among the people, ought not to be rejected without candid investigation.

"An attack of the sick-stomach is preceded by universal debility, more particularly felt in the lower extremities; impaired appetite, nausea, occasional vomiting, and an offensive breath, so

peculiar as to be instantly recognized by any one conversant with the disease. In some, these symptoms constitute the whole of the disease, and exist for several weeks. In others they are followed, after some days' or weeks' continuance by a more severe and general attack, characterized by great debility, sometimes irregular chills and flushings, a sense of great oppression about the præcordia, anxiety, deep respiration, heat in the region of the stomach, compared by the patients to fire, boiling water, etc.; thirst, nausea, and at longer or shorter intervals, according to the violence of the attack and to the period of the disease, violent retching and vomiting.

"In the arterial system, the disease puts on a variety of aspects in different persons, and in different stages of the disease. In the same person changes take place not unfrequently in the space of a few hours. The heart beats with such violence in some cases, as to elevate the bed-clothes, and to excite horror in the physician and bystanders, on laying the hand on the patient's breast. It seems to labor convulsively, and as though it were clogged in its motions by a superabundance of blood. The larger vessels partake of the heavy, throbbing and laborious motions of the heart. The blood forsakes the surface, especially that of the extremities, leaving it cold, and seems to rush to the larger internal vessels, engorging the viscera, and producing that oppression and anxiety about the præcordia, sighing in respiration, palpitation of the heart, etc. The patient feels nothing which he can strictly denominate pain; but the sense of heat, the oppression, the palpitation of the heart, and the violent efforts to vomit, constitute an *extreme* degree of distress.

"In other cases there is much less of this turmoil of the system. The patient, in the intervals of vomiting, lies in a stupid, listless condition, from which he is roused only by a returning fit of vomiting.

"The state of the pulse varies with the other symptoms. In the early stage of the disease, it is sometimes full and tense, at others full and soft. Later in the disease it is slow and weak, exhibiting little or no febrile action, except it be of suffocated, or at least, unequal excitement. The bowels are obstinately costive, and the stomach so irritable, that medicines and drinks are ejected soon after they are swallowed. In the early period of the disease some bile is discharged, but never, I believe, in great quantities. The matter ejected afterward seems to be little else than the drinks,

etc., taken in, mixed perhaps with a secretion from the stomach; and in violent cases, a flaky substance, varying in color from a light-brown to a deep-black, is mixed with the fluids."

The following extracts are taken from an article written by Dr. Asa Coleman. He thus describes the symptoms:

"The vomiting often returns every hour or two, during a whole week together, and the patient experiences some relief after each effort. During this stage of the disease, the strength is much prostrated; the patient complains of great distress and a burning sensation at the stomach; the bowels become obstinately costive; the thirst is frequently great; hot belchings and hiccough are often troublesome; the tongue is slightly furred, and the breath has a peculiar, disagreeable smell, resembling that of a person under a mercurial course."

The following extract gives the Doctor's views of the medical treatment. "In the first stages," he says, "an occasional use of emetics, cathartics, and laxatives, with rest and the use of light, wholesome food, will generally clear the system from its effects in a few weeks. In the more active forms of the disease, the exhibition of medicine is often extremely difficult, owing to the great irritability of the stomach. Emetics are then absolutely hurtful, especially antimonials, because of the irritation they excite in the stomach. In some cases where there was much retching to vomit, without throwing much up, I have directed a strong infusion of chamomile flowers, or warm water, to clear the stomach of its foul contents (with great advantage). Cathartics, especially of the saline kind, afford considerable relief, if the stomach will retain them sufficiently long to permit them to act on the bowels. It is generally necessary to assist their operation by the use of stimulating enemata, in order to overcome the obstinate costiveness. These remedies must be repeated daily during the continuance of the disease. Before resorting to the use of cathartics, however, I generally have recourse to some medicine for the purpose of allaying the irritability of the stomach, and to check the vomiting until the cathartic has time to operate. This is often difficult to accomplish. For this purpose I have found a solution of a few grains of carbonate of potass. in water, very serviceable, when often repeated; sometimes I have added a few drops of tincture of opium. The sugar of lead is another remedy, that I have seen advantageously used to allay the vomiting, till the operation of a cathartic could be produced. The operation of a cathartic generally affords a

considerable alleviation of the general symptoms; a large blister over the stomach appears to be of much service; bathing the feet in hot water, and applications of mustard to the feet and wrists, are usually resorted to. The general warm-bath has been employed in some instances with advantage."

In regard to the cause and nature of the disease, the writer remarks: "There are some circumstances connected with the history of this disease, so peculiar as to make them quite interesting. It is now a generally received opinion in the parts of the country where it prevails, that it is produced by some peculiar poison of the vegetable kind, and that the human system is affected with the disease only in consequence of using food that has been under the influence of this poison, such as milk, butter, or the flesh of animals laboring under the effects of this disease. The idea of a disease so formidable, produced in this manner, may appear somewhat chimerical to some, but there are many circumstances that favor the conclusion, and leave little doubt in my mind of its being the fact.

"1st. That domestic animals become affected with this disease, and under certain circumstances only, and that they are not subject to it except in parts of the country where the human species are subject to it. That cattle become affected with the disease from eating some vegetable poison, is inferred from these circumstances; cattle in pasture fields, where the ground has been cultivated, are not subject to it, it being only those that run at large in the woods and commons. I will state one of many instances that have fallen within my observation, in support of this opinion: A piece of woodland was inclosed as a sugar orchard, in which there was no water, either running or stagnant; situation high and dry; if a horse or ox were suffered to graze in this inclosure, for twelve or twenty-four hours, it would certainly become affected, and perhaps die in a day or two; while cattle in a pasture-field adjoining, have grazed the whole season without any symptoms of it. It may be inferred from circumstances like the above that it is not the effect of impure water. Many instances have been related to me by persons of credibility, of horses escaping from the stable and not remaining in the woods more than twelve or twenty-four hours, becoming so much affected as to die in a day or two, having all the peculiar symptoms of this disease in brutes, and this often in the winter season, when the ground was covered with snow; from which circumstance it is suspected to be a vine, or some plant not

easily affected with the frost. The disease is most fatal among cattle and horses in the fall months, but they become affected with it at all seasons of the year, when turned to the woods." * *

"2nd. That the milk, butter, beef, or the flesh of any animals, killed while laboring under this disease, will produce disease again in other animals, is proved by daily experience; sucking calves, which have no food but the milk of an affected cow, will show the peculiar symptoms, and often die of the disease; persons making use of the milk or butter, from the same cow, at the same time, will become affected.

"The milk given to domestic animals when the sucking calf shows symptoms of it, will produce the disease upon them, and this often without the cow's appearing much affected by the disease, a milk cow seldom showing many symptoms of it when regularly milked; the poison appearing to pass off principally by that secretion.

"I saw an instance of a whole family becoming sick with this disease, some of them in a few hours after dining upon a loin of veal, in which it was afterward satisfactorily ascertained that the calf labored under the disease at the time it was butchered, being sold in the market by an unprincipled person." * * *

"Mr. Thomas Hill, a respectable farmer, living near the southwest branch of the Miami river, informed me that having an ox die of this disease in his yard, and neglecting to remove it, his hogs, about seventy in number, devoured the carcass, and out of the above number about forty died in the course of twenty-four hours; the hogs were in good order, and appeared to be healthy previous to their feeding upon the carcass of the ox." * * *

"Perhaps a strong evidence of the origin of this disease being in some poisonous vegetable, may be drawn from the total exemption of those persons from it, who are particular as to the meat, milk, butter, and cheese they make use of, in situations where the disease has been most common; cattle and horses are also perfectly exempt from it while kept in pasture-fields where the ground has been cultivated, or in the stable.

"This disease is perhaps not dissimilar in many respects to diseases produced by some of the vegetable poisons of the narcotic class, with which we are acquainted, a large portion of it producing stupor, nausea, anxiety and vomiting, with other marks of an inflammation of the stomach; sometimes vertigo, pain in the head, and delirium, where the disease is violent; the inflammation

of the stomach perhaps is most generally of the erythematic kind, sometimes evidently of the phlegmonous. As to the particular *modus operandi* of this supposed vegetable poison in producing the constitutional affection which evidently takes place in what I have termed the chronic form of this disease, as well as in its active form, I shall not attempt to explain or hazard an opinion upon.

"The foregoing remarks will apply to the disease described, as it has appeared for several years past. The last season it has been much more prevalent than usual, and unusually severe in its symptoms. It is now the middle of January, 1821, and the complaint is still common, and *unusually fatal*. The uncommon prevalence of the disease during the season, has been attributed to the unusual dryness of it, which produced a great scarcity of vegetable food for cattle, thereby inducing them to eat any thing green, which has rendered it very fatal to them, and consequently, by inattention or skepticism as to the cause, has made it very prevalent and severe with the human species. The symptoms attending the disease the past season, have been more inflammatory than usual, and the affection of the brain greater, requiring early and copious blood-letting; some cases have terminated fatally in two or three days, from the active form of the disease supervening, where medical aid was not early called for, or improperly applied. The disease has been attended with a peculiar pain in the head, often with a stupor or coma, which, if not relieved by early blood-letting, has soon been followed by insensible stupor, or high delirium, and has soon destroyed the patient. In some cases a dilatation of the pupils of the eyes has been observable. A free use of the lancet, cathartics, *epispastics*, and the use of alkalies, has been the most successful mode of treatment."

I conclude by giving a few short extracts from an article written by Dr. Alexander McCall, of Tennessee, "on an extraordinary disease of Tennessee." He says:

"Among other plants"—in the vicinity which he describes—"is one called, by the country people, '*Indian Hachy*,' which is said to have been used medicinally by the Cherokee Indians for some purpose. But it is now chiefly remarkable for imparting to the milk of cows that feed on it, certain properties highly pernicious to the health of animals when taken into their stomachs. This plant, the botanical title of which I do not know, is perennial, sprouting up early in the spring, and flowering in July; its

blossoms are of a bluish color, fixed closely to an upright stamen of three or four inches in length. The root is somewhat bulbous, and the leaves bear a slight resemblance to the arum triphyllum when young and tender. So well convinced are the inhabitants of Goose Creek that this is the particular plant possessed of such highly detrimental qualities, that they have fenced in all those places where it is known to grow, with a view of preventing the access of cattle to it." * * * *

"After swallowing the milk, the person in a short time suffers from thirst, nausea, vertigo, confused or imperfect vision, vomiting often ensuing." * * * "In the year 1820, the citizens of Hartsville, a small village near Goose Creek, were almost all made sick, by partaking of beef sold in their market." * * * "Dogs, cats, hogs, buzzards, crows, or indeed any animal eating of the vitiated milk or flesh, are affected in a similar manner, and generally die in a few days. I saw a dog pass through every stage of the disorder. He had fed on the flesh of a calf which died by sucking its mother's milk." * * * "Persons poisoned, and particularly by the *rhus radicans*, unless completely cured, are liable to similar repetitions of attack." * * * "In treating the complaint, it has been found advisable always to administer an active emetic as soon as it has been ascertained that poisoned milk or meat has been taken into the stomach. Great relief is afforded by the free use of the lancet during the early stage of the fever. Charcoal and spirit of turpentine early exhibited, are considered very beneficial. Laudanum has been given to relieve pain in the region of the stomach. But sinapisms and blisters applied over the chest and epigastrium, are said to effect this purpose more promptly."

LECTURE XXXVII.

LOCAL DISEASES—CONTINUED.

Worms: Remarks; First Variety; Character; Appearance; Situation. Second Variety; Character; Appearance: Situation. Third Variety; Character; Appearance; Situation. Fourth Variety; Character; Appearance; Situation. Fifth Variety; Character; Appearance; Situation. General Symptoms; Origin; Spontaneous; Propagation; Remarks; Anatomical Character; Treatment for Lumbrici and others; Treatment for Tænia; New Remedy.

WORMS.

It is well established by scientific investigation, that almost every animal furnishes a *nidus* or nest for the growth of parasitic animals having a distinct organization and existence. The human body is not an exception to this rule. Parasitic varieties of Entozoa are found in the human stomach and intestinal track. The whole subject of Entozoa has been largely investigated, and you will find in the books more minute anatomical descriptions of the different varieties than I propose to give. It will suffice for the purposes of this lecture, to describe the *five* varieties most usually met with in the human alimentary canal. There are others than these that I myself have witnessed, but they are of too rare occurrence to be of any practical importance.

The *first* is the long, round worm, technically called *ascaris lumbricoides*, or *lumbricus*. It is so named from its resemblance to the common earth-worm, and is supposed, by some authorities, to belong to the same species. It is however, an entirely different animal, and belongs to another *genus*. It is scarcely necessary to give a minute description of this variety, as every one is more or less familiar with its appearance. I will here remark, that it varies greatly in size, and from four to eighteen inches in length. It is of a rounded shape, tapering at both ends. I have here a drawing of one, which you will see is a very correct representation. It varies also in color, having in some instances a whitish pink hue,

and in others a dull, dirty-yellow color. It is supposed to feed on the chyme found in the intestines, upon absorption from which the growth of the human system depends. It is distinguished by three tubercles or valves, surrounding the mouth, which open and shut, and by having a canal nearly through its entire length. This canal is of a brownish color, rather straight, and terminates a little anterior to the caudal extremity; yet in the larger portions of the worm, it is somewhat tortuous. The structure is muscular, with nerves and blood-vessels, and more or less cellular membrane, somewhat translucent, so that in the larger ones, the ovi-ducts, which resemble small worms, are visible. I have specimens of that kind selected from a large number; some forty or fifty of which were expelled at a single evacuation. One might easily have mistaken the ovi-ducts visible in the larger specimens for inchoate worms. The sexes exist in separate worms, the female being the largest, while the male is more pointed at the posterior extremity, which is curled up, and from which, by turns, a double penis is protruded from a sheath. They are readily distinguished, on careful examination, both by their general appearance and by their sexual developments. The females may be known by the sexual organs, the ovaries and ovi-ducts. Both the latter are white and thread-like organs. The ova have a thin shell about the 25th of a line in length. The males are not so numerous as the females, and I have thought are more difficult to expel from the intestines. This variety of worms is usually found in the small intestines.

As I have already remarked, it is supposed to subsist on the chyme. Whether mucus is a necessary part of its food or not, there is usually a large amount present. Of this the nidus is formed, and without it, it would scarcely be possible for the worm to exist in the bowels. Whether the presence of worms predisposes to the formation of mucus, or whether the mucus forms a pabulum necessary to their germination, are questions not easily solved. But they do not appear to be tolerated without the presence of mucus. They often penetrate the intestinal tube and pass into the abdomen. I have seen one or two instances of this in making post-mortem examinations, where I found they had become entangled in the coagulable lymph, resulting from the inflammation, which was followed by adhesion.

The second variety is the *ascaris vermicularis* or *oxyuris vermicularis*. It is also improperly called thread-worm, for there is another

variety more like a thread than this. It is commonly called the maw-worm, and is the smallest known. The male is said not to exceed two lines in length or perhaps the fourth of an inch, while the female is five or six lines, or half an inch long. It is very slender, and about the size of a common small sewing-thread. This species inhabits the rectum mainly, and is frequently found in great numbers, though it has been seen elsewhere in the alimentary track. You will see in this engraving, which I have here, one largely magnified, while the others are represented of the natural size. This is the little worm so troublesome to children, although it is not peculiar to them, but is occasionally found in adults.

Although of a different species, it is of the same order and family with the round worm, and is said by some to develop itself, or exhibit a state of action periodically. During its period of quiescence, it is supposed to lodge in the mucous folds of the intestines. At a certain stage of its existence, not entirely determined,—and indeed the whole theory may be doubtful,—it evolves from its nidus, and produces great irritation, which is said to be periodical, occurring usually at night. The child runs about during the day apparently well, but when night comes it complains of itching in the rectum, which sometimes amounts to very great inconvenience and distress. These however, are peculiarities not so well settled as others. That the worm does exist mainly, though not exclusively, in the rectum, and that it does produce great local disturbance, is well determined, and that the itching may come on most generally toward evening, is quite probable, though I have seen its irritation produced at every period of the day. In females these worms sometimes pass into the vagina, and produce no little uneasiness.

The male species has a spiral or coiled appearance; the head is not much thicker than the tail, the head of both male and female, under the microscope, shows a transparent tuberosity, forming lateral wings. The female is larger and straighter, but about one-third from its head is considerably increased in thickness, then contracts and gradually tapers to a size too small to be seen by the unaided eye.

The third variety is called *tricocephalus dispar*, or the long thread worm. You see in this engraving a specimen considerably magnified, retaining however, its correct proportions, while below it is represented in its natural state. This worm is described as from

one to two inches in length. I think this is short of the size to which it often arrives: I have seen it four inches long. It is like a small thread, except at the posterior extremity, where it is enlarged. As far as my observation extends, it is not a very common worm. Its shape is somewhat like that of a cat-fish reversed, being largest at the caudal extremity. About two-thirds of the anterior extremity is a delicate capillary, the size of a small hair; the other extremity is as large as a sewing-thread. It is of a light color. It has a straight alimentary canal passing directly through it, except in the large portion, where it is slightly tortuous. The male is much smaller than the female, and differs slightly in shape. It has a very small and pointed posterior extremity, of a spiral appearance, with a long penis invested in a proper sheath; while its anterior part is a mere capillary. The female has a longer anterior capillary, while its posterior extremity is straight and only slightly bent at the end. They are propagated by ova, which are oval, with a tough shell, and belong to the same family with the two preceding varieties.

The *fourth* variety is the *tænia solum, vulgaris*, etc., or common tape-worm. Of this family there is perhaps but one variety in the United States, though there is another peculiar to other sections of the world. I have here a drawing of a section of the common tape-worm. It varies greatly in size and length. The ordinary length is from seven to fifteen feet, while it is sometimes said to arrive at the enormous length of a hundred feet, which I am disposed to doubt. It is of a flat, ribbon-like shape, from three to five lines in breadth in the largest places, and tapers to almost a mere thread at the caudal extremity. It is of a white or yellowish color, and is made up of numerous segments, which segments or joints are most distinct and perfect at a distance from the head. Each of these segments as you will see from the drawing, resembles a gourd-seed, or is quadrangular in shape. The head is smaller than most of the body, and has a small papilla in the center with openings. From two of these openings there are canals passing down the body, which communicate with each other by means of transverse tubes, and what is singular, these canals, after passing through the neck, are not entirely within the body of the little animal. It is supposed that these worms can exist or reproduce themselves if but a single joint is left in the alimentary canal. This I consider very doubtful, unless the *head* is left. For joints are developed only from the neck, and push those first formed still

further back. The posterior joints are therefore the oldest and most perfect, and often come away filled with mature ova. They are replaced by new joints, and it therefore seems necessary to expel the *head* of the animal to prevent reproduction. This variety is hermaphrodite. It is supposed that the ova, as they escape from the animal, are fertilized by a fluid which is made to flow from its vesicles by the pressure of the ova in passing out.

It inhabits the small intestines. Vogel, p. 424, says: "It can not be denied that the tape-worm, by its presence in the intestinal canal, may cause derangement of the organism; nevertheless its pathological importance is commonly over-estimated. It often remains in the body for a long time without its presence being revealed by the slightest symptom; sometimes, particularly when of great size, its movements become annoying and unpleasant."

The *fifth* variety is called *tænia lata*, *bothriocephalus latus*, or broad tape-worm. It is said never to have been seen in the United States, though some writers claim that it has been imported. It is peculiar to Russia, Poland, Eastern Prussia, Switzerland and some parts of France, and Vogel says that if it is found elsewhere, "we may be assured that the patient is a native of one of the above-named countries, or at least has caught it there." It is much broader and its joints shorter than the common long tape-worm. It differs from the *tænia vulgaris* by the joints being more perfect, well developed, and thrown off in connected rows, and by a cavity in the center and not in the border of the joint. It varies in length from one to twenty feet.

These are the varieties of worms usually described by the authorities. I have seen what appeared to be a different variety. Some few years since I was called to see a child having all the ordinary symptoms of worms. After taking some active worm medicine, the child evacuated nearly a quart of little animals entirely different from any thing I ever before saw, and from any thing that I have found described in the books. They had the appearance of worms in the chrysalis state, and were about three-fourths of an inch in length and perhaps two lines thick. They exhibited the corrugated appearance of some varieties of larvæ, which you have no doubt seen in the ground, vulgarly called slugs. As I did not have an opportunity for a very careful examination, I can say but little on the subject.

Almost every variety of symptoms is found to result from verminous irritation in the human system. But the symptoms most

frequently occur in children, and are generally produced by the long, round or common worm. You will find the abdomen prominent, full or bloated; the appetite exceedingly variable; sometimes deficient and sometimes voracious. The breath is usually offensive; the tongue generally has a white, coated appearance, and often the upper lip will be much swollen. In some cases the eye-lids become edematous, and so swollen that the child can hardly see; in other edematous patches will present themselves in other parts of the body. I recollect seeing a child on one occasion with a sac of water on the end and lower part of the penis, involving the frenum and a portion of the prepuce. I suspected from the symptoms, that worms was the cause of the difficulty, and on administering worm medicine the swelling disappeared. In another case the child's face was so swollen that its eyes were closed, and an eruption appeared resembling that of scarlet fever. But the peculiar symptoms of scarlet-fever being absent, I suspected the presence of worms, from the fact that all the children of the family were subject to have them. The mother was an intelligent, self-possessed lady, who never sent for a physician until she really had cause for alarm. In this case I found the child lying in a stupid condition, with a high fever, his face red, as in scarlatina, swollen and disfigured, and his eyes closed with the tumefaction. I administered worm medicine, and on calling the next morning, I found it had operated freely, but had not started the worms, and the symptoms were not in the least ameliorated. The eyes were still closed; the child could be roused with difficulty, and I was doubtful of his recovery. Upon giving the case a thorough reëxamination, my opinion as to the cause of the difficulty was confirmed, and I therefore repeated the medicine. When I called in the evening he was up and playing round the house, having obtained relief, about an hour before I called, by evacuating *forty-seven* worms, not one of which was less than ten inches long.

Children troubled with worms, frequently start in their sleep, and are apt to have restless nights. Almost all children of nervous temperament will be subject to this starting during febrile action, and it can not be considered a diagnostic system of worms. Another common symptom, is a peculiar paleness around the mouth, extending up the sides of the nose, though I have seen it when the patient was otherwise affected. It probably results from gastrointestinal irritation. Itching in the anus is the most common and only particular effect produced by the small worms, and you can

imagine that this irritation may be sufficiently extensive to disturb the general system. Chorea sometimes, and epileptic fits, very often result from verminous irritation; but the latter are usually harmless when properly treated. A peculiarly dry, choking cough, is a very common symptom. Children almost invariably have a dry cough, and a tendency to swallow as though they were choked. It is said by the authorities that most children affected by worms are subject to indigestion; but I have observed that the most vigorous, healthy children are most obnoxious to them, while those of nervous temperament and spare habits are least liable to be troubled; and I suppose their nervous systems are too sensitive to tolerate the long-continued irritation which would be likely to be set up by the presence of worms. Evacuations would most probably soon follow.

It is a most remarkable fact which I have never seen stated in the books, and to which I would call your particular attention, that lying-in women are quite subject to worms. I have in a number of cases found fever following child-birth, which was not amenable to ordinary remedies, but which was relieved immediately upon the evacuation of worms. And where there are no other circumstances to account for symptoms of this kind, I am universally in the habit of administering worm medicines, and almost always with success. Whether the period of gestation favors the formations of worms, I am not prepared to say, but am inclined to that opinion. The fact stated is one that you should bear in mind, as you might otherwise administer purgative medicines of various kinds without giving any relief.

In regard to the *origin* of worms, the subject is involved in obscurity and doubt. By some they are supposed to be spontaneous. This view is maintained from the supposed fact that children are born with worms, and that they are found in the intestines of premature or still-born children. This fact seems to imply an origin from some other cause than an extrinsic one, but it may be doubted whether it proves a spontaneous origin. Another theory accounts for their existence by propagation from progenitors of like species. But this theory, you will see, does not touch the question of the *first origin*. It merely supposes that this class of animals is *continued* by the exercise of its reproductive powers, as in the case of other animals. The question still remains, do they now in any case originate *de novo* from the direct and immediate exercise of creative power? This appears to me to be the only

question; for to say that matter, or the elements of matter, acting under established laws, known or unknown, may be arranged in collocations favorable to the development of these, or any other organisms, is simply to take for granted that the *germ*, the *vital principle* of the organism, has been previously created. Or if it is denied that any thing is thus assumed, and if it is still maintained that the first existence of these organisms, necessarily or otherwise, grows out of certain collocations of matter, even then, I ask, what additional light is shed upon the question? In either case the beginning is equally dependent on creative power, and equally beyond our comprehension. It seems however, to simplify the matter somewhat, to follow the numerous analogies of nature, which favor the theory of the original creation of the *type*, with the power of reproduction. The conclusion would then be inevitable, that these animals, like all others, are now generated only by propagation.

To support this conclusion, as well as to show the state of German opinion, I quote the following from Vogel's *Pathological Anatomy*, page 382, et seq.:

"Respecting the *origin* of parasites, there have existed from the most remote periods, when they were first remarked, till the present time, two opposite opinions. According to one view they are generated, in the same manner as most other animals and plants, by propagation from progenitors of like species; according to the second view, they originate from equivocal generation. That many parasites can, and actually do, arise by descent from parents of a similar kind (by germules, seeds and ova), is at the present day allowed even by the believers in equivocal generation. The controversy hinges only on the question: can some parasites, in certain cases, also originate *de novo*, or are those at present occurring invariably, and in every case, derived from parents of like species? A positive reply to this question, based upon convincing observations and researches, is as little possible now as at the time when Pallas wrote his interesting dissertation upon the subject,* although since that period numerous eminent investigators have devoted their attention to the formative relations of parasites; but, nevertheless, it appears to me that a majority of important reasons favors the view

* P. S. Pallas, de infestis viventibus intra viventia. Lugduni Batavorum, 1760. "Traditis nunc omnium sententiis de viventium intra viventia origine, expositisque argumentis propugnantibus singulas et contrariis, cujuslibet, urit verosimillimam mente, comprobare, donec experimenta quæ in hac parte maximopere deficiunt, certos nos reddunt."

that at the present time no parasites are spontaneously developed, but that all are, in some way or other, derived from parents of like species."

Vogel then gives a "brief abstract" of "the doctrine of spontaneous generation," as follows: "The idea of spontaneous generation is a philosophical necessity. All organisms with which we are acquainted, that are now derived from parents of like species, must at one time have arisen in another manner without parents. Whatever name may be applied to this primitive origin, or whatever view may be taken of it, whether it be termed creation or receive any other name, it is, in reality, spontaneous generation, in contrast with derivation from parents. This necessity of a spontaneous origin of the organisms at present existing is, moreover, daily proved by experience. Geology demonstrates that many, indeed the greater number of the organisms now on the earth's surface, did not exist at an earlier period, since we find no vestiges of them. Accordingly, it is undeniable that spontaneous generation occupies a prominent position in the history of the world, as a mode of origin of all organisms. The question, therefore, turns only upon this point: can *existing* organisms, which at a former period originated spontaneously, and have subsequently propagated themselves in another manner, again rise spontaneously? or, in other words, is there a repeated spontaneous origin of creatures of the same species?

"Let us now consult experience for materials in order to reply to this question. We find that in all cases where opportunity has been afforded of tracing, by direct observation, the origin of an organism, it has taken place by propagation; while on the contrary, not a solitary unexceptionable observation of a spontaneous origin exists in the records of natural history. Analogy is, therefore, completely in favor of the view that propagation is the only manner in which the existing organisms are engendered. The value of this evidence is further enhanced by the history of science. In earlier times it was admitted that even the vertebrate animals were produced by repeated spontaneous generations; geese and ducks from barnacles (*Lepas*); the batrachia and serpents from mud; and still at later periods, insects, as the coprophagi, from dung; and fleas from putrid urine. No one, at the present day, doubts that all these animals are generated by propagation alone. Indeed, in modern times, chiefly through the labors of Ehrenberg, even the generation of infusoria has been limited to the propaga-

tive system. Analogy would, therefore, lead us to conclude that parasites are also produced in this manner alone. The objections which have been urged against this view, and the arguments which have been adduced in favor of a spontaneous production of parasites, rest chiefly on the ground, that in many cases the origin of these organisms, by means of propagation, is inexplicable; and is, therefore, held to be impossible. But it is overlooked that the assumption of their spontaneous origin is, in reality, merely a formal explanation, which leaves us completely in the dark respecting the true reasons and conditions of their production. Moreover, many of those reasons have latterly become invalidated by the progress of knowledge, since not merely the possibility, but also the reality, of their propagation to other organisms, and the inducing conditions, have been demonstrated in various parasites; and although in this respect, at present, much appears mysterious, yet the numerous experiences of late years must raise a hope in every unbiased observer, that the further advancement of knowledge will clear up the obscurity which, at present, envelops this province, and will establish the origin of all parasites by propagation, to the exclusion of spontaneous origin. The prevalence of the belief in spontaneous generation was an important obstacle to the progress of knowledge, since it hindered accurate investigations regarding the formative relations of parasites; and with the general diffusion of the view, that all parasites originate by propagation, observations concerning their actual transference from one individual to another, will, doubtless, also accumulate."

"If then," continues Vogel, "we assume that parasites are invariably derived from parents of the same kind, and are never produced spontaneously, it follows that they are never a true product of a disease, and can not, therefore, originate directly from degenerated particles of the body, depraved secretions, etc. It is, however, undeniable that morbid changes of portions of the body frequently exercise a certain influence upon their origin. These changes may favor their development, and, indeed, alone render it possible, by inducing conditions essential to it; they can again prove injurious to it, since they may remove conditions necessary to its occurrence. Thus, for example, vegetable parasites (fungi) do not in general develop themselves upon mucous membranes, until, by morbid processes, a deposit of coagulated fibrin, which serves as a bed, has become prepared for them, and until this exudation has passed into a state of putrid decomposition. An

abundant secretion of mucus favors the development of worms which have entered the intestinal canal from without. Some states of the organism, on the contrary, disqualify it as a habitation for parasites. Thus, most of the entozoa in the intestinal canal are expelled by increased peristaltic action; some fluids of the body, as bile, urine, gastric juice, and some medicines, prove deleterious, and indeed, fatal to some of them; inflammation and indeed supuration, may injure, and even destroy them."

In connection with the fact that an abundant secretion of mucus is always attendant upon verminous irritation, I wish to add a practical remark. Accumulations of mucus *may* often result from irritation produced by other causes. It will therefore behoove you not to be too hasty in inferring the existence of worms from this consideration alone. But if the family predisposition was known to favor their existence, it would generally be sufficient ground to warrant the conclusion. If the family predisposition was against the opinion, further investigation should be made to ascertain if there was not some other cause of the phenomenon. It is also important to bear in mind that the traditional notion, that worms naturally exist in the human stomach, and should not be removed unless they produce constitutional effects, is absurd and groundless. However much they may indicate functional derangement, yet they are not always present.

As worms rarely cause death, opportunities seldom occur for *anatomical* observations. In such cases as have been examined, accumulations of mucus, and more or less irritation, have been found to exist. The latter appearance however, might have been the effect of adjacent inflammation. In one case, perforation of the intestine was found, and the worm had lodged in the cavity of the abdomen. Some varieties have the ability to insert their capillary heads into the membrane.

In regard to the *treatment* for worms, the remedies are various. Every physician has his favorite. The treatment of course must be varied according to the symptoms of each case. If for instance you are called to treat a child in convulsions, where worms are supposed to be the cause, and in the majority of cases such is the cause, the first indication is to relieve the convulsions. I have little confidence in a warm bath, which is the popular remedy for such cases, but prefer brisk friction and warm applications to the abdomen, with stimulating friction of the spine. I also bathe the head with warm water and fan it, and apply hot water and sina-

pisms to the feet, if they are cold. An antispasmodic should be administered immediately. The sudorific tincture is an excellent remedy, but should be given with care to young children. From half to a teaspoonful would not be an over-dose for a child of from two to four years of age. Equal parts of the tinct. asafœtida and sulphuric ether make an excellent remedy. I have also given chloroform, with prompt relief. Such convulsions appear exceedingly alarming, but are not particularly dangerous, and soon pass off.

After these symptoms are relieved, a decoction of the compound powder of senna and jalap, with pink and wormseed, given in sufficient doses to produce free evacuations from the bowels, and repeated two or three days, will usually be successful, and in such cases has been my main reliance. It is equally reliable in the treatment of the small, long, thread-worm, which inhabits the same portion of the intestinal tube. It is composed as follows:

R. Comp. powd. senna and jalap,
 Spigelia Marylandica,
 Chenopod. anth. $\bar{a}\bar{a}$ ʒiij.

Decoct in 1 pint of water—dose, a tablespoonful.

When this course is pursued, you will scarcely ever fail to procure relief on the first day, and almost certainly on the second. If however, it has been necessary, I have been in the habit of repeating on the third day. And such has been my success with this measure, that when relief was not obtained on the third day, it was conclusive evidence to my mind that the symptoms were deceptive.

There is a popular prejudice against pink in many communities, on account of the apparently alarming symptoms it sometimes produces. These however, are evanescent and perfectly harmless.

You will frequently find periodical fever associated with worms, which in many instances will subside on expulsion of the worms. But when it is dependent on malarial influence, it will not thus yield, and then it will be necessary to administer antiperiodic remedies.

When the pink mixture has failed, I have substituted, with abundant success on several occasions, a combination of the extract of spigelia and sulphate of iron, administered two or three times a day, and followed by a brisk cathartic. I recollect one case in particular, in which every other remedy had failed, and this was resorted to with complete success. An enormous quantity of worms was discharged, and I think in this case there were three

or four, at least eighteen inches long, and of a corresponding size. You can imagine they were difficult to remove.

A favorite recipe for worms, where the patient is not much sick, is the following:

- R. Oil of Chenopodium, ʒss.
Castor Oil, ʒj.
Oil of Spike., ʒiij.
Oil of Turpentine, ʒij.
Croton Oil, gtts. xvj. Mix.

A teaspoonful should be given once or twice a day, and will be found less troublesome to administer than medicines which have to be given every hour or two. In this combination you have excellent anthelmintic and efficient purgative properties. It should be thoroughly mixed to guard against the effects of the croton oil. A favorite remedy with the planters of the South, is the Pride of China, or *melia azedarach*, given in decoction, in the use of which I have had no experience. Analogous to this in some respects is the burr of red cedar, the efficacy of which probably depends on the turpentine it contains. These then are the chief remedies for the common round worm, and also for the thread-worm.

The ascarides, or that variety which infests the rectum, can best be removed by local treatment, though the vermifuge and cathartics will rarely fail to bring away more or less of them. I have uniformly succeeded in dislodging and discharging this variety with injections of moderately strong salt and water, or soap suds, repeated every day or two, for some time. In addition to these, I have also injected a solution of copperas, say a drachm to a gill of warm water. When irritation, amounting to dysentery, follows or is produced by these worms, an injection of althea or slippery-elm, or the common starch and laudanum injection, may be used.

The symptoms of the tape-worm are somewhat peculiar and worthy of brief consideration. It usually inhabits the small intestines and most generally exists singly. It rarely occurs in children or aged persons, though I believe it has in some cases been found in the former. It is comparatively rare in persons of any age. In my own practice, I have never met with more than two or three cases. It is said that tape-worms sometimes exist for a considerable length of time without producing much inconvenience or suffering. The disturbance they occasion is not generally that of severe pain, but uneasiness and distress, which often, sooner or

later, impairs the general health. The symptoms usually complained of, are, more or less uneasiness in the head, generally in the forehead, sometimes amounting to pain, slight giddiness and ringing in the ears. The eyes often have a heavy feeling and the patient is frequently rubbing them; the lids become edematous, which is also a frequent symptom of the common round worm; the pupils are sometimes dilated, and you will often see spasmodic twitchings of the muscles, both of the eyes and lids. There are frequent changes of the countenance, it at one moment being highly flushed, and then again being exceedingly pale. Twitching of the muscles, particularly about the mouth, and a pinched or contracted appearance of the nostrils, accompanied with an itching sensation, are very common. The appetite is variable, being sometimes voracious and at others deficient. The breath is always offensive and the tongue usually furred. There are frequent turns of nausea and sometimes ejections of frothy mucus. There is often, as with children having the common worm, a grating of the teeth while asleep, fullness of the abdomen with contraction about the navel, and a sensation after sleeping all night, of an animal moving about in the bowels, accompanied by fugitive, shooting pains; all these symptoms subside after eating. The patient, as these symptoms gradually increase, becomes weak and nervous. And finally, worn down with the excitement, he becomes hypochondriacal and sometimes deranged. The most unequivocal symptom, is a discharge of some portion of the joints of the worm.

In regard to *treatment*, I have in the few cases that have come under my observation, procured relief by the use of a decoction of the pomegranate bark, continued for a few days, and then followed by purgative doses of spirits of turpentine. The decoction was made of an ounce of the bark to a pint of water, and taken on an empty stomach. This was continued a few days, and then followed with about one ounce of the spirits of turpentine and the same quantity of salad oil. If it did not operate in two hours, I followed with a dose of the compound powder of senna and jalap. This will rarely fail to operate freely, and will usually give relief. Some physicians have found the turpentine equally effective in much less doses than I have here recommended; but the amount I have been in the habit of giving is not as large as you will find recommended in some of the authorities. The root of the *aspidium filix mas*, or male fern, has a reputation, in some sections of the country, not equaled by any other article of the *materia medica*;

but whether this is well founded, I am unable to say from personal experience. There is doubtless some foundation for the opinion so generally entertained in regard to it. The Boston Medical and Surgical Journal contains one or two communications in regard to a new remedy, which, from the character of the Journal, and the apparent truth and simplicity of the statements, I here copy: Vol. 45, p. 201—

"The following letter," says the Editor, "is from Richard Soule, Esq., of Boston, a gentleman of the highest respectability, whose only object is to make known extensively, among physicians, what he considers a specific for the destruction of the tape-worm," etc.

"DR. J. V. C. SMITH—

Dear Sir:—The merits of the very simple *pumpkin-seed cure* for *tape-worm*, rest on the testimony of those who have thereby succeeded in expelling these troublesome intruders from the premises they had occupied for years; and the accidental agency the writer has had in some of these cases, has brought a number of applications for the recipe. Should you deem it of sufficient importance to occupy a page in your widely circulated Journal, it may serve to relieve some afflicted one who can not avail himself of the physician's aid, and also give to physicians a new remedy; I therefore place the recipe at your disposal.

Yours, assuredly,

R. S.

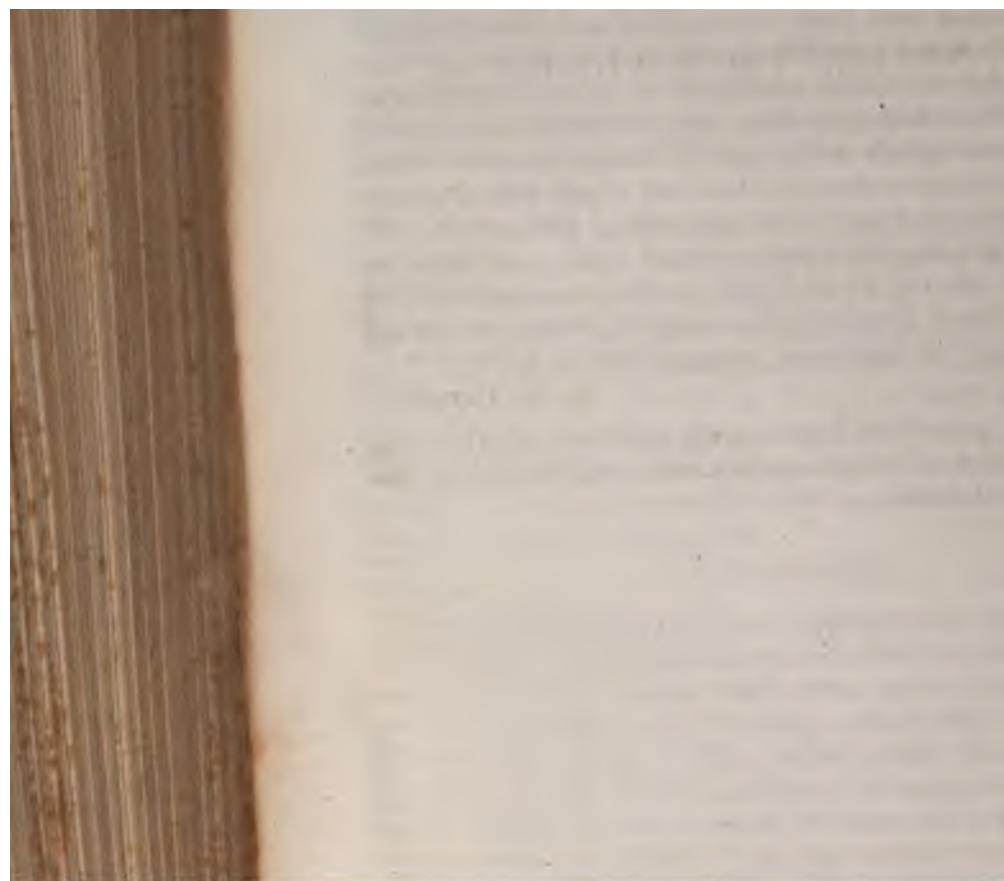
"*Cure for Tape-worm.*—Procure sufficient seed of the pumpkin (those grown in the West Indies are the best), to make two ounces after removing the outside shell of the seed; put them into a mortar and add half a pint of water; pound them well up, and make a liquid orgeat of them, which strain through a cloth. Drink this mixture in the morning on a fasting stomach. If it does not operate in the course of an hour and a half, take one ounce of castor-oil. Drink all the time as much fresh, cool water as the stomach can bear or contain; that is, drench yourself with water. After taking the orgeat, if the stomach is well rubbed with ether, and an injection of about 60 drops of it taken, you will find it an assistant to the orgeat, but this may not be necessary. Should the first application of the remedy not answer, repeat it the next morning, and there is no doubt your complaint will be removed. The worm will leave the patient all at once, and probably entire. This can be ascertained by finding the small end or head of it, which tapers off almost to a point."

The writer adds, in a postscript, that he had testimony from a friend in New York, that this remedy had "cured probably a dozen different persons afflicted with the tape-worm, and who had been given over by their physicians." In one case the worm expelled, "was 34 feet long, and each link about one inch." He also mentions a lady in Boston, who was restored to perfect health, by the same means, after years of prostration and efforts for relief.

In the same volume, page 274, another correspondent says that he recommended the above remedy to an intimate friend, who, "for want of West Indian, or other pumpkin seeds, took undried acorn or marrow-squash seeds, and proceeded, *secundem artem*, following the orgeat, in about one hour and a half, with about six drachms of castor-oil, taken in two spoonfuls of Holland gin. He drank very little water twice, drank and ate nothing else till noon, when the only effect of his faith and practice was manifested 'in one liquid discharge, containing the squirming worm; at one end about one-third of an inch broad, tapering down to nothing.'"

F. W. CRAIGIN.

The medical periodicals have recently mentioned another remedy—the product of *brayera anthelmintica*, and known by the common name of *kousso*.



INDEX TO VOL. I.

	PAGE		PAGE
Active Congestion.....	118	Anæmia—	
determination to the brain	124	General	108
duration and results.....	123	causes	109
morbid determination	119	consequences	110
nature,	122	symptoms	108
pathological changes	120	local	111
physiological determination	118	therapeutic requirements in Anæ-	112
symptoms.....	123, 124	mia	
therapeutic suggestions	127	Anal Fistula	685
Æsculapius deified	24	description	685
Ague and Fever	275	treatment	687
causes.....	290	Angina	572
cold stage	277	cause of	573
forming stage	277	chronic	575
hot stage	279	diet in	576
sweating stage	280	treatment	573
complications	286	tonsillaris	577
diagnosis	291	Ani, Prolapsus	691
modifications.....	275	causes.....	692
periodicity discussed	284	treatment	692
post-mortem	289	Antidyspeptic pill	722
prognosis	291	Aplastic deposits	164
treatment	291	Apthæ	565
palliative	291	treatment	566
radical	296	Armstrong on Typhus	359
Ague, anticipating	276	Arnott on Colloid.....	179
deferring	276	Art of medicine	40
erratic	277	Ascaris Lumbricoides.....	778
masked	281	symptoms	782
Ague cake.....	283, 289	treatment	788
Albumen, in the blood	59	Ascaris Vermicularis.....	779
Allison's definition of disease	42	symptoms	782
American Eclecticism	84	treatment	788
Amygdalitis	577	Asclepiads.....	25
Anæmia	108	Asiatic Cholera.....	730
Definition and synonyms.....	108	anatomical characters	742

	PAGE		PAGE
Asiatic Cholera—		Bloodletting—	
blood in	741	remarks concerning	56
cause	744	Blood, morbid states of.....	52
diagnosis and nature	747	abnormal constituents	60
history	731	causes and consequences	52
prognosis	749	changes in.....	62
reaction and convalescence.....	739	Carpenter on	55
rice-water discharges	742	foreign substances in.....	52
recipes for..... 750, 751,	752	proportion, deranged.....	54
report on, by Dr. Jordan.....	757	Wharton Jones on.....	54
stages and symptoms	735	Boerhaave's Reform	27
treatment	750	Bostock, quotations from.....	28
Aspidium filix mas, for worms	791	Botanics.....	31
Asthenic Plethora.....	114	Boussingault, M.'s discovery	270
Assyria, early history of medicine in... 24		Bowels, inflammation of the	617
Atrophy	140	acute	618
general	140	causes.....	621
causes and symptoms	141	diagnosis	623
therapeutic indications.....	142	prognosis	620
partial	143	post-mortem	621
therapeutic requirements.....	144	symptoms	618
glandular	144	treatment	623
of muscular fiber	144	chronic	626
Atrophia Mesenterica	144	Bowels, obstruction of the	710
Autopsy, general remarks on	49	treatment	713
Baily on Periodicity.....	285	Bowman's Med. Chem., Table from... 57, 58	
Bell on Congestive Fever.....	385	Brain, inflammation of the	539
on Fowler's Solution	301	anatomical character.....	544
on Intermittent Fever	301, 303	causes	549
Bengal Fever.....	318	diagnosis	543
Bilious Colic	697	prognosis	544
anatomical developments.....	700	symptoms	540
cause	699	treatment	549
symptoms and nature	698	chronic	553
recipe for	702	Brain, passive congestion of the.....	134
treatment	700	Broussais' theory of fever	266
Bilious Fever.....	318	Buchanan, Dr., quotations from	32
treatment	342	Burrows, Dr.	124
Black Vomit, description of	397	Cacoplastic deposits.....	161
Bleeding in Angina.....	575	causes	164
Blood, composition of	57	tendency of to degenerate	162
albumen	59	Cake, ague.....	283
fibrin	57	Cancer or Carcinoma	177
saline elements	60	colloid or gum	179
water	60	medullary or soft.....	178
Blood in Cholera	741	scirrhus or stone	177
Blood in Yellow Fever.....	398	causes	181
Blood, determination of	118	nature and development	180
Blood, determination of to the brain.... 124		peculiar constituents.....	179
Blood-letting, effects of.....	510	symptoms	182

	PAGE		PAGE
Cancer or Carcinoma—		Colic, bilious—	
therapeutic measures	183	symptoms, nature	698
Cancer of the Rectum	669	treatment	700
treatment	670	lead	702
Cancrum Oris	565	cause	705
Canker, causes and treatment of	565	diagnosis, prognosis,	705
Campbell, Dr. H. F., on excito-secretory		symptoms	702
nerves	87	treatment	706
Carpenter Dr., on the blood	56	painter's	702
on tonicity	74	spasmodic, or wind	695
on excito-motor disease	92	cause	695
Chapman's Nosology	35	symptoms, treatment	696
Charleston, yellow fever at	390	Colitis	631
Chills and Fever	275	treatment	638
Chloride of Zinc in cancer	189	Congestion, active	118
Cholera Epidemic	730	passive	129
anatomical characters	742	hypostatic	130
blood in	741	Congestive Fever	358
causes	744	complications	370
convalescence	739	degeneration into nervous con-	
diagnosis and nature	747	tinued	366
history of	731	description of, by Dr. Armstrong	359
lecture on, by Dr. Morrow	754	diet, in	374
reaction	739	emetics in	368
recipes for	750, 751, 752	malarial origin	364
report on, by Dr. Jordan	757	not contagious	363
prognosis	749	not typhoid	362
rice-water discharges	742	symptoms	364
stages and symptoms	735	treatment	367
treatment	750	Congestive Intermittent	287
Cholera Morbus	723	Constipation	716
anatomical characters	726	causes	718
causes	725	character	716
diagnosis	726	symptoms	717
symptoms	723	treatment	719
treatment	727	Contagion on typhoid	445
Chomel, or Typhoid	454	Continued Fever	429
on use of chloride of soda	456	Controversies in Medicine	27
Chronic Dysentery	646	Crawcour, Dr., on the use of glycerine	154
treatment	648	Crisis in fever	265
Cicatrices	159	Costiveness	716
management of injuries	160	Cullen's Nosology	35
repair of structures	159	Cullen on Periodicity	285
Classification of diseases	35, 51	Cynanche Tonsillaris	576
Clinical case of fever	663	causes, prognosis	579
Cod Liver Oil, in structural degeneration	155	character	577
Coelmintha	194	treatment	580
Coleman, Dr., on milk sickness	773	Debility	204
Colic, varieties of	695	Deferring Ague	276
bilious	697	Degeneration of Tissues	149
cause	699		

	PAGE		PAGE
Deposits in or upon Tissues.....	158	Disease of Reflex Nervous Influence—	
aplastic	164	involuntary excito-motor power	92
cacoplastic.....	161	deficiency of	94
euplastic.....	159	increase of.....	92
therapeutic indications.....	170	causes of.....	93
Determination of Blood	118	diseases consequent on.....	92
duration	123	reflected sensibility	96
morbid	119	Disease of Secretion	97
nature	122	deficient secretion.....	101
pathological changes.....	120	causes.....	103
physiological	118	therapeutic indications.....	104
symptoms	123	excessive secretion	98
to the brain.....	124	causes.....	99
therapeutic suggestions	127	therapeutic measures	101
Diagnosis.....	248	functions, secretory	97
Diarrhea.....	628	assimilation and nutrition.....	98
symptoms and treatment.....	628	perverted secretion	104
Dickson, Dr. S. H., on yellow fever.....	409	therapeutic indications.....	105
Digestion, process of.....	602	secretion proper	98
Dioscorea villosa for bilious colic	700	Disease of the Solids	63
Disease, definition of	42	causes, mechanical and chemical	64
classification of.....	51	modifications of vital properties	67
Disease of the Fluids	51	Disease of Tonicity	74
abnormal character	60	defective and excessive	75
causes and consequences.....	52	causes and treatment	76
changes.....	62	Disease, proximate elements of	107
classes	51	Disease, signs and symptoms of	239
Dr. Carpenter on	55	general distinctions of	36
Dr. Wharton Jones, on.....	54	investigation of	36
foreign substances.....	52	Diseases of the Rectum	664
proportion deranged.....	54	Diseases of Nutrition	135
Diseased Irritability.....	70	general atrophy	140
defective contractility	72	causes and symptoms	141
therapeutic indications	73	therapeutic indications.....	142
excessive irritability.....	71	partial atrophy—causes	143
therapeutic measures.....	72	therapeutic indications.....	144
manifestations of	71	hypertrophy	136
Disease of the Nervous Functions	77	causes.....	138
diseased sensibility	78	complex	138
general	78	simple.....	137
local	81	therapeutic indications.....	139
excessive	79	Dickson, Dr. S. H. on yellow fever	390, 406, 409
defective—perverted	80	Dogmatists	26
diseased voluntary motion	83	Dothin enteritis.....	430
causes.....	85	Duodenitis.....	617
excess, deficiency	84	Dysentery, acute	631
perversion	85	causes.....	636
therapeutic indications	86	post-mortem	637
Disease of Reflex Nervous Influence...	87	prognosis	636
excito-motory and excito-secretory	87	symptoms	633
nerves.....	87		

	PAGE		PAGE
Dysentery, acute—		Etiology or Causes of Disease—	
treatment	863	exciting causes	212
adynamic	635	cognizable	213
chronic	646	atmospheric vicissitudes	229
duration, post-mortem	647	bodily exertion	222
symptoms	646	chemical agents	214
treatment	648	excessive evacuations ...	224
epidemic	641	excessive nervous action	228
Dyspepsia	602	filth, bad air, etc.	226
causes	604	ingesta	214
phenomena	602	mechanical influences ...	213
treatment	607	suppressed evacuations... ..	224
hygienic	607	non-cognizable	232
medicinal	614	endemic poisons	232
Eclectic Medicine, its claims	31	epidemic do.	233
Egyptian Priests	23	infectious do.	236
Elements of the Blood	57	predispositions	198
albumen	59	debility	204
fibrin	57	existing disease	210
saline matters, water	60	functional excitement ...	209
Empirics	26	occupation & mode of life	211
Enteric Fever	430	peculiarities of constitution... ..	199*
Enteritis	617	age	201
causes	621	hereditary tendencies....	199
diagnosis	623	idiosyncrasies, sex	200
prognosis	620	influence of previous dis-	
post-mortem	621	ease	204
symptoms	618	temperaments	199
treatment	623	Euplastic Deposits	159
chronic, treatment	626	management of injuries	160
Entozoa	192	repair of structures	159
classes and symptoms	193	Excessive Secretion	98
therapeutic indications	195	causes	99
Epidemic Cholera	730	therapeutic indications	101
anatomical character	742	Excito-motory and Excito-secretory	
blood in	741	Nerves	87
causes	744	Excito-motor Power, increase of	92
diagnosis and nature	747	causes	93
history of	731	diseases consequent on	92
lecture on, by Dr. Morrow	754	deficiency of, and causes	94
prognosis	749	Eye, disease of, a case	559
reaction and convalescence	739	Father of Medicine	25
rice-water discharges in	742	Fauces, Inflammation of	572
recipes for	750, 751, 752	causes and treatment	573
report on, by Dr. Jordan	757	chronic	575
stages and symptoms	735	Fever in general	257
treatment	750	and ague	275
Erratic Ague	277	causes and classes of	266
Etiology or Causes of Disease	196	congestive	358
classification of causes	197	crisis in	265

	PAGE		PAGE
ver in general—		Gastritis, Chronic—	
follicular.....	429	diet.....	600
intermittent	275	symptoms.....	597
treatment.....	291	treatment	599
pernicious	375	Gastro-intestinal, irritation.....	349
treatment	380	Gelsemium sempervirens.....	299
remittent or bilious	318	Gendrin, on the blood.....	491, 501
treatment.....	342	General Pathology.....	39
symptomatic and idiopathic.....	266	Gerhard, Dr.....	430
typhoid or continued.....	429	Gibson, Dr.....	680
treatment.....	452, 463	Glandular atrophy.....	144
yellow	388	Glechoma nepeta, use of in colic.....	708
treatment.....	417	Glossitis.....	570
stages of.....	258	causes.....	571
cold.....	259	symptoms.....	570
declining	264	treatment	571
forming.....	258	Glover, Dr., analysis of tubercular mat-	
hot	262	ter by.....	168
Fissure of the Rectum, description.....	682	Glycerine.....	154
treatment	683	Good's nosology.....	35
Fistula in Ano, description.....	685	Greece, medicine in ancient.....	24
treatment	687		
Fibrin.....	57	Hale, Dr.....	430
Fluids, disease of the	51	Hall, Marshall, on excito-secretory	
abnormal character.....	60	nerves.....	88
causes and consequence.....	52	Harley, Dr.....	53
changes	62	Haviland, Dr. on chloride of zinc.....	189
classified.....	51	Haynes, Dr. on milk-sickness.....	770
foreign substances in.....	52	Hæmastasis.....	132, 337
proportion deranged.....	54	Hemorrhage in Typhoid.....	426
Flux.....	631	Hemorrhoids	671
treatment	638	causes.....	675
Functional Disease.....	63	diagnosis	674
disease of reflex and sympathetic		primitive type.....	673
nervous influence.....	87	treatment.....	675
diseased irritability.....	70	Hepatic Disorder, in remittent fever....	351
sensibility.....	78	Hippocrates, account of.....	24
tonicity.....	74	Historical sketch of medicine.....	25
voluntary motion.....	83	History of Asiatic cholera.....	731
secretion.....	97	Humoralists.....	266
primary elements of.....	69	Hunter, on the blood.....	491, 501
Fungus Hematodes.....	178	Hydatids.....	193
Gastritis.....	586	Hyperemia.....	112
acute	587	general.....	112
causes	592	asthenic.....	114
pathology of.....	590	sthenic.....	113
symptoms.....	587	treatment.....	115
treatment.....	593	local.....	118
chronic	596	determination to brain.....	124
causes, diagnosis.....	599	duration.....	123
		morbid determination.....	119

	PAGE		PAGE
Hyperæmia, local—		Inflammation, of the brain—	
nature.....	122	chronic	553
pathological changes..	120	ear	554
physiological determination	118	treatment	556
symptoms	123	fauces.....	572
therapeutic suggestions....	127	cause and treatment.....	573
Hypertrophy.....	136	intestines, small.....	617
causes.....	138	treatment	623
complex... ..	138	intestines, large.....	631
simple	137	mouth.. ..	560
therapeutic measures.....	139	causes.....	562
Idiopathic Fever	266	symptoms	561
Ileitis, ileo-colitis	618	treatment	562
Ileus... ..	710	note on	135
Indian Hachy, as a cause of milk-sick-		oesophagus, cause and symptoms...	584
ness.....	776	peritoneum	651
Indigestion	602	acute	652
causes... ..	604	cause	658
phenomena.....	602	diagnosis	657
treatment, hygienic.....	607	periodicity	655
medicinal.	614	post-mortem	658
Induration	145	prognosis	657
causes and treatment.....	146	symptoms	652
Infantile sore mouth....	563	chronic	661
Inflammation	472	treatment	658
causes	476	symptoms	661
changes of blood in.....	491	stomach	586
chronic	490	acute	587
ligatures in	537	cause	592
Magendie on	503, 512	pathological phenomena..	590
results or terminations.....	478	symptoms.....	587
symptoms	472	treatment.....	593
Tweedie on.....	499, 528	chronic	596
treatment	510, 533	symptoms	597
Inflammation of the bowels.....	617	treatment	599
acute	617	tongue	570
causes, diagnosis.....	621	causes and treatment	571
prognosis	620	tonsils.....	576
post-mortem	621	cause	579
symptoms	618	treatment	580
treatment	623	Introductory Lecture.....	21
chronic	626	Irritability, Diseased.....	70
symptoms, treatment	626	defective contractility	72
brain	539	therapeutic indications.....	73
anatomical relations.....	544	excessive irritability	71
causes.....	549	therapeutic measures.....	72
diagnosis	543	Jackson, E.B., treatment of typhoid by	452
prognosis	544	Jessamine, yellow.....	299
symptoms	540	Jones, Wharton.....	54
treatment	549	Jordan, Dr., report on cholera by.....	757

	PAGE		PAGE
Large Intestines, inflammation of.....	681	Morbid Growths, malignant—	
treatment.....	638	scirrhus.....	177
Lead colic.....	702	symptoms.....	182
anatomical developments.....	706	therapeutic measures.....	183
cause and diagnosis.....	705	non-malignant.....	174
prognosis.....	705	cysts.....	175
recipes for.....	706	origin and cause.....	176
symptoms.....	702	organized tumors.....	176
treatment.....	706	causes.....	177
Leared, Dr., on cod liver oil.....	155	parasitic animals.....	192
Ligatures.....	587	classes and symptoms.....	193
Liquor Sanguinis, elements of.....	57	treatment.....	105
albumen.....	59	Morbid states of the Blood, how pro-	
fibrin.....	57	duced.....	52
saline matters, water.....	60	Morrow, Dr., decease of.....	34
Liver, passive congestion of.....	184	on cholera.....	754
Lewis, M. on Typhoid.....	489, 457	on yellow fever.....	423
Lumbricoides.....	778	on intermittent fever.....	397
treatment.....	788		
Magendie, on the Blood.....	503, 512	Natches, yellow-fever at.....	395, 403
Malaria.....	232, 270, 319	Necrosis.....	489
Malignant Cholera.....	780	Nerves, excito-motory and secretory...	87
Marasmus.....	140	Nervous Consumption.....	140
Masked Ague.....	281	Nervous Fever.....	430
McCall, Dr., on Milk Sickness.....	776	Nervous Functions, diseased.....	77
McVoy, Dr.'s treatment of Yellow Fever	424	diseased sensibility.....	78
Medicine, Art of.....	40	general.....	78
historical sketch of.....	23	excessive.....	79
science of.....	39	deficient.....	80
Methodics.....	26	perverted.....	80
Miasmata.....	232, 270, 319	local.....	81
Miasmatic Remittent Fever.....	319	Neuralgia, case of.....	559
Michigan Fever.....	318	Neutralizing Physic.....	602
Milk Sickness.....	763	Non-malignant Growths.....	174
nature.....	767	cysts.....	175
causes.....	768	origin and cause.....	176
Coleman, on.....	778	organized tumors.....	176
diagnosis.....	766	cause.....	177
Haynes, on.....	770	Nosology.....	35
McCall, on.....	776	Nurse's Sore-Mouth.....	567
note on.....	770	Dr. Holt's remedy.....	568
symptoms and cases.....	764	Dr. Wilcox's do.....	568
treatment.....	769	symptoms and treatment.....	567
Morbid Growths.....	174	Nutrition, diseases of.....	135
malignant.....	177	deficient nutrition.....	140
causes.....	181	general atrophy.....	140
gelatinous carcinoma.....	179	causes and symptoms...	141
medullary do.....	178	therapeutic indications...	142
nature and development.....	180	partial atrophy.....	143
peculiar constituents.....	179	therapeutic indications...	142
		increased nutrition.....	136

	PAGE		PAGE
Nutrition, increased—		Peritonitis—	
causes.....	188	treatment	658
complex hypertrophy	188	chronic, symptoms.....	661
simple do.	187	treatment	662
therapeutic indications	189	Perlee, Dr., on Yellow Fever.....	895, 408
perverted nutrition	145	Pernicious Fever	375
Obstruction of the Bowels, symptoms	710	diagnosis	378
treatment	718	old practice in	379
Esophagitis	584	prognosis	378
Organized Tumors	176	symptoms	376
cause	177	treatment	380
Otitis	554	Wood's Views respecting.....	879, 382
causes	555	Perverted Nutrition	145
chronic	558	Perverted Secretion	104
recipes for.....	558	treatment	105
symptoms	554	Petechia	486
treatment	556	Phrenitis	539
Painters' Colic	702	anatomical character.....	544
cause and prognosis.....	705	causes	549
recipes for.....	706	chronic	553
symptoms	706	diagnosis.....	543
treatment.....	702	ligatures	551
Palmer, on the Blood	502	prognosis	544
Parasites, origin of	784	symptoms	540
Parasitic animals	192	treatment.....	549
classes, symptoms.....	193	Phrenology, Science of.....	547
treatment	195	Physic, Dr.	680
Passive Congestion	129	Physiology, province of	42
causes, atony of blood-vessels.....	129	Piles	671
venous obstruction	131	causes.....	675
symptoms	133	diagnosis.....	674
therapeutic indications	134	primitive type	673
of the brain	134	treatment	676
of the stomach and liver	134	Piperine in Intermittent Fever	300
Pathology, general	39	Plethora, general	112
objects of	42	asthenic	114
Pathological Investigation, methods of	43	sthenic	113
analytical	48	treatment	115
autopsy	49	Polyæmia	112
synthetical	44	Priests, early practitioners.....	24
Periodicity, of intermittent fever	284	Prolapsus Ani.....	691
Peritonitis	651	attendant on dysentery	650
acute and puerperal	652	causes, treatment	692
causes	656	Prognosis, empirical, rational.....	251
diagnosis	657	Proximate elements of disease.....	107
periodicity	655	Psychordiarria	193
post-mortem	656	Pumpkin Seeds, remedy for tape-worm	792
prognosis	657	Pythagoras	25
symptoms	652	Quartan Type	275
		Quintan and Quotidian Type	275

	PAGE		PAGE
Quinsy	578	Remittent Fever—	
causes.....	579	correct treatment.....	342
treatment	580	determination to brain	352
Recipe for alterative sirup.....	559	diagnosis	370
antidyspeptic pill	722	distinguished from intermittent ...	320
compound tincture of tamarac	314	duration.....	331
compound powder of rhubarb.....	602	endemic character explained	329
emetic powder	640	febrile stage	321
for bilious colic.....	702	forming stage	320
cholera	750	gastro-intestinal irritation	349
intermittent fever.....	293, 315	hepatic disorder	351
lead colic	706	latent period	330
nurses' sore mouth.....	569	liability of persons.....	320, 329
otitis	558, 559	modifications.....	322
worms	789, 790	nature of	327
pod. lep. and taraxacum pill.....	315	post-mortem	332
pod. lep. sang. and tarax. pill.....	352	prognosis	330
quinia and iron.....	344	remission	322
rochelia virginiana	651	treatment	333
for tonic in ague	315	where prevalent	319, 329
Rectum, diseases of	664	Remittent Pernicious Fever	375
organic malignant.....	669	Retention of Urine, in Typhoid.....	426
treatment	670	Rhus Radicans, as a cause of Milk-	
organic non-malignant	667	Sickness.....	777
diagnosis	667	Rhus Toxicodendron, as a cause of	
treatment	668	Milk-Sickness.....	768
Rectum, fissure of.....	682	Rochelia Virginiana, in dysentery	651
treatment	683	Scarlet Fever a cause of otitis	556
fistula of.....	685	Scirrhus	177
treatment	687	Science of Medicine.....	39
prolapsus of, description	691	Schönbein, on the influence of ozone...	234
treatment	692	Secretion, disease of.....	97
stricture of	664	deficient secretion	101
treatment	665	causes.....	103
Reflex Nervous Influence, disease of...	87	therapeutic indications.....	104
excito-motory nerves	87	excessive secretion	98
excito-secretory nerves	87	causes	99
Dr. Campbell on	87	therapeutic indications.....	101
Marshall Hall on	88	functions in health	97
involuntary excito-motor power...		assimilation and nutrition ...	98
increase of.....	92	secretion proper.....	98
cause.....	98	perverted secretion	104
diseases consequent on..	92	therapeutic indications.....	105
deficiency of	94	Sensibility, diseased	78
reflected sensibility	96	general	78
Remittent Congestive Fever.....	358	deficient	80
Remittent Fever	318	excessive.....	79
causes.....	328	perverted	80
complications	322	local	81
convalescence	356	Sensibility, reflected	96

	PAGE		PAGE
Sick Stomach, or Milk-Sickness	763	Stomatitis —	
cause and nature	767	symptoms	561
diagnosis	766	treatment	562
Dr. Coleman, on	773	Stricture of the Rectum	664
Dr. Haynes, on	770	organic malignant	669
Dr. McCall, on	777	treatment.....	665, 668, 670
note on	770	organic non-malignant	667
symptoms and cases	764	treatment	668
treatment	769	spasmodic	664
Smith, Dr., on treatment of typhoid ...	460	treatment	665
Softening of Tissues	147	Strongylus gigas	194
treatment	148	Structural Diseases	135
Solids, Disease of the	63	Subsultus and Sordes	485
causes, mechanical and chemical... 64		Sudamina	434
modifications of vital properties ... 67		Sun Pain	281
Solidists	266	Sympathetic Nervous System	328
Sore-Mouth	560	Symptomatic Fever	266
treatment	562	Symptomatology, definition of	239
Sore-Throat, character of	572	diagnosis	248
Spasmodic Colic	695	physical signs	240
treatment	696	auscultation	241
Spasmodic Cholera	730	inspection	240
treatment	750	percussion and pressure	241
Sporadic Cholera	723	succussion	241
anatomical character.....	726	prognosis	251
cause	725	vital symptoms.....	243
diagnosis	726	evacuations	246
symptoms	723	pulse	244
treatment	727	skin and tongue	245
Spasmodic	108	Tænia	781
Stages of Fever	258	treatment	788
cold.....	259	Tantini's cases of Congestive Fever ...	385
forming	258	Tape-Worm, character of	781
hot	262	treatment	788
sweating	264	Temples of Æsculapius	24
Statistical Report on Cholera	757	Tinnitus Aurium	540
Sterelmintha	194	Tubercle, Yellow	164
Sthenic Hyperemia	113	Termination of Inflammation	478
Stomach, Inflammation of	586	Tertian Type of Fever	275
acute	587	Thomas, Dr.'s, treatment of Yellow	
causes.....	592	Fever	426
pathology	590	Thread Worm	780
symptoms	587	Thrush, symptoms of	563
treatment	593	causes, treatment	564
chronic	596	Tissués, modify inflammation	487
diet	600	degeneration of.....	149
symptoms	597	calcareous	152
treatment	599	fatty	150
Stomach, Passive Congestion of	134	fibrous	149
Stomatitis	560	granular.....	150
causes.....	562	therapeutic measures	153

	PAGE		PAGE
Tissues—		Ware, Dr.	430
Dr. Crawcour, on glycerine...	154	Willis, on periodicity	285
Dr. Leared, on cod-liver oil...	155	Wind colic	695
softening of, cause	147	symptoms, treatment.....	696
therapeutic indications	148	Wood, definition of disease by	42
deposits in and upon	158	on bleeding.....	335, 337
Tobacco, injection of	715	on intermittent fever.....	308, 307
Tongue, inflammation of	570	on pernicious fever.....	379, 382
causes and treatment	571	on remittent fever.....	333
Tonicity, disease of	74	Worms, varieties of	778
defective, excessive	75	first, ascaris lumbricoides.....	778
causes and treatment	76	second, vermicularis	779
Tonsillitis	576	third, tricocephalus dispar.....	780
causes.....	579	tenia solum.....	781
character	577	tenia lata	782
chronic	579	origin of.....	784
prognosis	579	by Vogel.....	785
treatment	580	recipes for	789, 790
Typhoid Fever	429	symptoms	783
anatomical character	438	treatment	788
causes.....	444	Yellow Fever	383
contagion and infection	445	anatomical character.....	398
convalescence	471	black vomit in.....	397
diagnosis	450	causes	401
nature.....	449	by Dr. Dickson.....	390, 406, 409
prognosis	451	by Dr. Perlee	395, 406
symptoms	431	contagious character.....	409
treatment	452, 463	description of, at Charleston.....	390, 406
by Chomel.....	454	at Natchez.....	395, 406
by Jackson	452	diagnosis	415
by Lewis	457	endemic and epidemic.....	389
by N. Smith.....	460	history of.....	388
unfavorable symptoms.....	451	prognosis	416
Typhus Fever (See Congestive)	358, 37	symptoms	389
Typhus Interodes	388	treatment.....	417
Types of fever	275	by Dr. McVoy.....	424
Tweedie, on inflammation	499	by Dr. Morrow..	423
		by Dr. Thomas	426
Ulceration of the mouth	565	Yellow Jessamine	299
treatment	566	Yellow Tubercle	164
Ultraists	26	chemical analysis.....	169
Voluntary motion, disease of	83	effects on structures.....	165
causes.....	85	microscopic character.....	168
general excess, deficiency.....	84	nature	167
perversion.....	85	softening and absorption.....	165
therapeutic indications.....	86	therapeutic indications.....	170

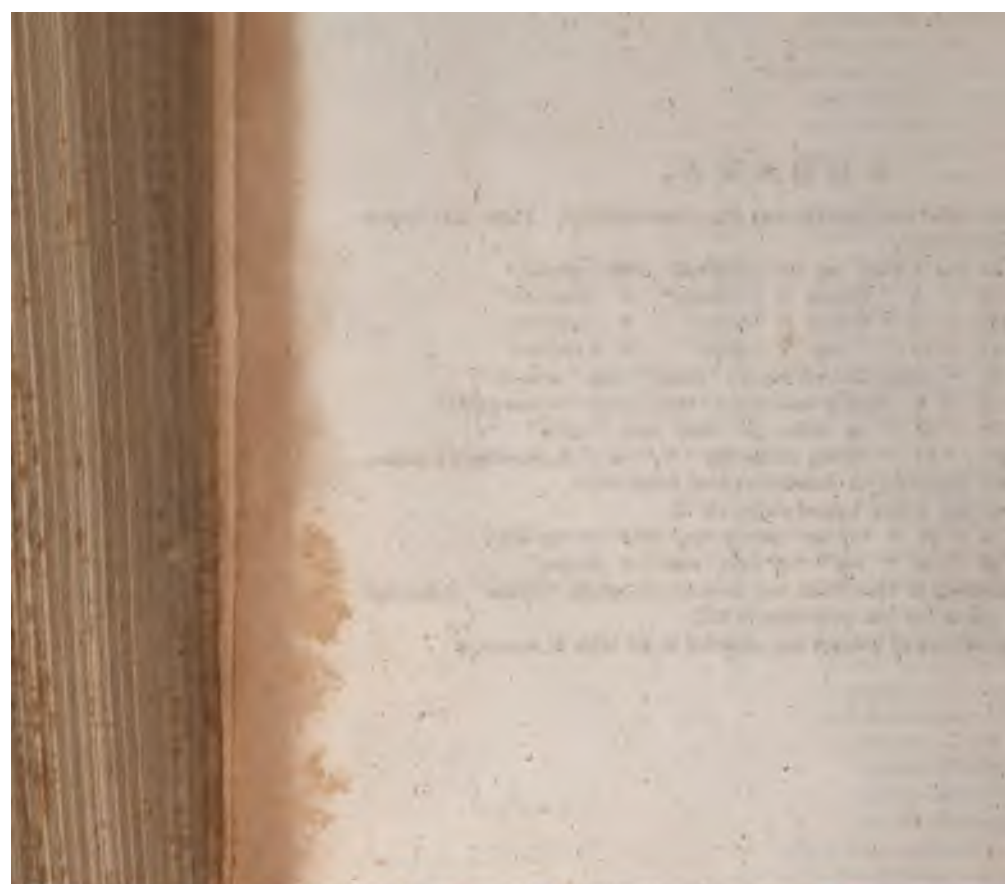
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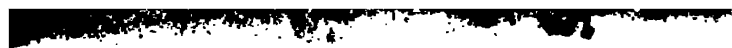
While preparing the index some inaccuracies have been detected. Those that impair the sense are here referred to:

- Page 45 line 8 from top for "nominal," read "normal."
- " 80 " 2 " bottom " "narcotic," " "neurotic."
- " 140 " 4 " bottom " "with," " "without."
- " 141 " 19 " top " "with," " "without."
- " 141 " 9 and 22 from top for "atony," read "atrophy."
- " 145 " 4 from bottom insert "and," before "a consequent,"
- " 270 " 18 " top strike out "too," and "much."
- " 270 " 12 " bottom strike the "W," out of *M. Boussingault's name*.
- " 881 head-line, for REMITTENT read PERNICIOUS
- " 569 line 4 from bottom strike out *āā*.
- " 675 " 10 " top for "norriŕ-like," read "or ring-like."
- " 733 " 16 " top " "of Asia," read "of Europe."

The name of Dr. Dickson of Charleston was erroneously spelled "Dixon" in the first edition and in some places has been so printed in this.

Some errors in the captions of lectures are corrected in the table of contents.









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